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SUSTAINABILITY IN
HIGHER EDUCATION: DIRECTIONS FOR CHANGE

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These Proceedings were prepared by Lisa McCormack and Netdao Chamroendararasmee.

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Edith Cowan University (ECU)

Named after the first woman elected to an Australian Parliament, Edith Cowan University (ECU) is Western Australia's second largest university. A modern university established n 1991, ECU is a market leader in education for the service professions: nursing, education, business, information technology, communications and multimedia, regional professional studies, aviation, the performing arts, justice studies and psychology. The University works closely with private and public sector organisations, locally and overseas, in designing its study programs. The University has almost 23,000 students and three metropolitan campuses in Perth with a regional campus in Bunbury. The Joondalup Campus is part of the Joondalup Learning Precinct, a cluster that incorporates a university,, a police academy and a technical college.

Khon Kaen University (KKU)

Khon Kaen University was one of four regional universities established in 1964 as part of a decentralized development plan for higher education in Thailand. KKU is the educational and learning centre in the northeast of Thailand and is recognized as the leader of new innovations in teaching, learning, and research in the region. The campus is situated just a few kilometres from the centre of Khon Kaen City which is the trade and administrative hub of the Northeast and is on a main transport route between the capital and the Mekong Sub-region. Thus, KKU is ideally placed to support the development of the Northeast and its neighbouring countries. From small beginning, the University currently has more than 34,000 students in 17 faculties, 1 satellite campus, 1 school, and 3 colleges and currently offers more than 300 programs covering almost every discipline up to doctoral degree level. A satellite campus is located in Nong Khai.

Bansomdejchaopraya Rajabhat University (BSRU)

Bansomdejchaopraya Rajabhat University was originally established in 1896. BSRU has represented quality and longevity for more than a century. Over the years, the University has grown and developed into a prestigious institution. As a public tertiary educational institute for community development, BSRU holds to the principle of education for all, aims at improving the quality of life of the local people, and seeks to increase the educational qualifications of working people, as well as expanding educational opportunities for secondary school graduates. BSRU's mission is to develop the community, conduct research activities, give academic public service, provide appropriate technology, conserve the arts and culture, promote teachers' qualifications and produce qualified teachers as a human resource for the country.

FOREWORD

EDU-COM 2008 "Sustainability In Higher Education: Directions For Change" is the fourth international conference in a sequence focussing on engagement, empowerment and most importantly, sustainability. The previous conferences, EDU-COM 2002, EDU-COM 2004, and EDU-COM 2006, examined education without borders, partnership and sustainability, and Engagement and Empowerment. Now, in 2008, universities are implementing many of the perceptions and ideas advanced in 2002, 2004 and 2006.

Here we are entirely consistent with UNESCO's Decade of Education for Sustainable Development, recognising that world-wide, we are experiencing a fundamental transformation towards knowledge-based and knowledge-dependant communities facilitated by vastly improved information and communication technologies. Higher education for sustainable development "has come to be seen as a process of learning how to make decisions that consider the long-term future of the economy, ecology and equity of all communities" (UNESCO Portal). Capacity development for such futures-oriented thinking is a key task of higher education.

Increasingly, universities are in partnership with community organisations and industry, bridging cultural, economic and political boundaries, engaging with the community, empowering community and university alike through active, purposeful collaboration. EDU-COM 2008 seeks to build on these initiatives, again through the perceptions and ideas of conference delegates. The four sub-themes of EDU-COM 2008 have been selected to enable delegates to address these new opportunities through their research interests. These are:

Community as a Resource for Sustainability
Interdisciplinary Initiatives for Sustainability
Innovations in Learning and Teaching for Sustainability
Entrepreneurship for Sustainability in Higher Education

As in 2002, 2004, 2006, and 2008, delegates were drawn from many Asian countries and from all five continents.

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OPENING ADDRESS

The Organising Committee were honoured by the following guests who took part in the Opening Ceremony of EDU-COM 2008 International Conference:

His Excellency Paul Grigson, Australian Ambassador to Thailand

Associate Professor Dr Piniti Ratananukul,
Deputy Secretary General Commission on Higher Education, Thailand

Associate Professor James Cross
Edith Cowan University

Professor Dr Arshad Omari
Deputy Vice Chancellor (Academic), Edith Cowan University

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SECTION ONE - KEYNOTE ADDRESSES

Associate Professor Dr Piniti Ratananukul
Deputy Secretary General, Commission on Higher Education, Thailand
Topic**: Sustainability in Higher Education**

Abstract

The crucial stakeholders in sustaining development process are undeniably human resources and the involvement of community at large. Consequently, human element is the decisive factor to the success of sustainable development. In light of the themes of the conference, "Community as a Resource for Sustainability" in the case of Thailand, Thai universities play a key role in decentralization of authority by enhancing empowerment and building capacity of the Thai village council to be accountable for its own local and rural development. Thai universities also provide technical and administrative supports to strengthen knowledge and skills on local administration by means of staff training and local administration system designing.

Nowadays social, economic, public justice or human developments are multi-disciplinary in nature, to solve problems with a single discipline is no longer valid and effective. Mobilisation of experts, knowledge and skills from different disciplines will be able to tackle problems more effectively and holistically. With the interdisciplinary initiatives covering topic-wise, area-wise or agenda-wise it is best to gather as many stakeholders so as to assure suitable and sustainable solutions will be made.

In keeping up with the constant global changes at present, faculties and universities need to keep updating and reviewing learning and teaching methodology regularly and continually to catch up with the most up-to-date scientific and innovative developments in response to the current development and world of work. Faculty and students should be exposed to the outside world to enhance their global perspectives and competency. Universities and faculties should pay more sensitive attention to learners, and their needs should be heeded with careful and empathetic thoughtfulness so as to win their satisfactions and loyalties.

With the aim of remaining sustainable and competitive, universities have to maintain its competitive edge by improving its entrepreneurial skills by encouraging our universities to start up their business incubator units with the support of inter-disciplinary faculty members such as engineering, business administration, laws, etc. At the beginning business incubators need to integrate training with research and development to ensure that new entrepreneurs will have necessary skills to carry out business transactions and eventually nurture them to be able to spin-off as a firmly established business enterprise and be able to tackle risks to remain intact in new business.

Professor Thomas KS Wong RN, PhD, JP
The Hong Kong Institute of Education, Hong Kong
Topic: **Entrepreneurship for Sustainability in Higher Education**

Abstract
As early as 1995, UNESCO commissioned a project on Education for the 21st Century. The four pillars of education, *learning to be, learning to know, learning to do and learning to live together* were identified as critical elements for an economically productive and socially rich well-being. Traditionally, higher education focuses primarily on *learning to know and learning to do*. In recent years, however, a paradigmatic shift characterized by increasing emphasis on *learning to be* and *learning to live together* has been noted. Together with the continuous demand for life-long education, the shift has begun to challenge the goals of higher education and questions the sustainability of many universities. The need for higher education to think out of the box is eminent. Entrepreneurship, an integral attribute of today's leadership is becoming more important in ensuring the paradigmatic shift is painless and effective. Many critics would argue that the core business of higher education differs from that of the business sector and therefore strategies deployed by the latter do not have any relevance to the former. In this paper, the speaker will argue otherwise, using some examples to illustrate how entrepreneurship helps the sustainability of higher education.

Bionotes:
Prof. Wong is the Chair Professor of Health Studies and Dean of Faculty of Arts and Sciences of the Hong Kong Institute of Education, Member of the Western Pacific Advisory Committee on Health Research, World Health Organization, Member of Sigma Theta Tau International Futures Advisory Council and Nursing Knowledge International's Board of Directors, Member of the Health & Medical Advisory Committee and Member of Research Council of the Hong Kong Food & Health Bureau, Vice-chairman of the Human Organ Transplant Board, Chairman of the Hong Kong Nursing Council, Member of the Human Resource Committee and Staff Appeal Committee, Hospital Authority, Member of the Hong Kong Red Cross Paramedical Education Advisory Committee and Senior Member of the Chinese Nursing Association. To recognize his contributions to the society and nursing, he was conferred the Outstanding Young Person award in 1991 and Justice of the Peace in 2007. As one of the pioneers in the development of information technology for nursing practice, education and research, Prof. Wong has built the first Telehealth and Telecare System which is now used in the Integrative Health Clinics run by The Hong Kong Polytechnic University and a community health centre in UK. His achievements in this area can be reflected by the major awards he obtained since 2002, the Sigma Theta Tau Honours Society of Nursing International Information Technology Award 2002 for Clinical Nursing Application, the Best of Health, Asia Pacific Information and Communication Technology Award 2002, the Bronze Award in the Fifth China International Invention Expo 2004 for the work of his team on personal chamber for infection control, the Bronze Award in the 2005 International Innovation, Research and Technology Expo in Brussels for their non-invasive blood glucose meter, the Gold Medal award conferred in the 34th International Exhibition of Inventions, New Techniques and Products of Geneva, 2006 and the Russian Ministry of Education and Science Award for their Telemedication Management System (eMed Administrator), the Gold Medal award, Honouring of University Inventions for the Smart Wristband for Sleep Apnoea conferred in the International Trade Fair Ideas, Inventions and Novelties (IENA) at Nuremberg, Germany, 2006 and the Silver Medal awarded in Brussels Eureka 2007 for his Novel Integrative Acupressure Pen for Pain Relief. Recently, his invention of the alpha version for Non-invasive Glucose Meter (quantitative analysis) was awarded Jury Commendation and Gold Medal at the 35th International, New Techniques and Products of Geneva, Switzerland, 2007. This attracts world's attention. Professor Wong has also been instrumental in harnessing computerized simulations, virtual reality and web based learning in the nursing and health programmes offered to both undergraduate and postgraduate students. Being an active researcher, he has been publishing widely in international journals and a member of the editorial and advisory boards of several renowned journals. To recognize his contribution to the University, he was conferred with The President's Awards for Excellent Performance/Achievement (Services) and the Faculty Awards for Outstanding Performance/Achievement in 2003 and again Outstanding Performance/Achievement (Team) by The Hong Kong Polytechnic University in 2005.

Professor Pornchai Matangkasombut
Former President Mahidol University, Bangkok, Thailand
Topic **: Sustainability of Society First and Universities to Follow**

Abstract
As the title implies, I would like to emphasise the notion that Society at large must come before universities thinking of sustainability or whatever else. It is noteworthy that, in the rush to prepare new generations of young people for the 'fast changing world'. Almost all of us in universities have given priority to 'ability to compete', 'ability to keep a job etc' over the notion of 'cultivating a knowledgeable and DECENT individual.' The question is who can society expect to be responsible for the latter.

If universities are to be responsible, then there are serious questions that we must address. Some of these are as follows:

Is cultivating human decency compatible with preparing students for the changing world of rate race? How can we strike a balance and come up with win-win curriculum, environments and ways of learning? Are we expecting too much when we want our graduates to be ready to earn a good living while contented with oneself with family with friends with others and with the environments and the world. Is it too late to cultivate mindfulness at college level? What are some of the more successful experiences in Contemplative Studies around the world and in Thailand?

Bionotes:
Professor Pornchai Matangkasombut was born in Thailand where he won a Government Scholarship for studies at the University of Wisconsin and earned a B.A (1962) and went on to earn both a M.D and a Ph.D. in 1968 at the same institution. Upon his return to Thailand he helped build a new Department of Microbiology at the Faculty of Science, Mahidol University, Bangkok, Thailand and became the First Thai Chairman of department between 1973-1987, Dean of Faculty of Science between 1991-1999, and President of Mahidol University from 1999 to December 2007. As an Immunologist he published extensively in both National and International journals including articles in Nature and served on several editorial boards of some of these journals. He also served as board member of several professional societies in Thailand and Internationally, including the International Union of Microbiological Societies (1986-1990). He has been active in international cooperation and served as the founding Secretary General of the Unesco Southeast Asia Regional Network of Microbiology (1973-1979) as well as an Expert Advisor in Immunology of the World Health Organization (1974-present). He has played an important role in Research promotion and National research policy and served as Chair of the National Research Council Division of Medical Sciences and Chair of Domestic Vaccine Development and Manufacturing of the National Vaccine Policy Board (1988-present) and a Board member (1996-present) of the National Biotechnology Policy Board (chaired by the Prime Minister). He was the founding CEO (2003) and Chair of the Board (2004-present) of the Thailand Centre of Excellence for Life Sciences (TCELS)

He has been accorded with numerous honours and decorations, the most noteworthy are the Highest decorations of the orders of the Crown and of the White Elephant and a member of the order of Chulachomkloa from His Majesty the King of Thailand; a Commandeur of the order of Palmes Academics from the Prime Minister of France. He was also conferred the Doctor of Sciences (Honoris Causa) from Mahidol University and Osaka University.

Dr Logan Muller
Unitec, New Zealand
Topic: **Education for Extinction?: Time to Hit Reset**

Abstract
Sustainability needs to be more than a topic in our education institutes. As an advanced animal specie, education for sustainability must be an underlying philosophy – a core value. Currently education does not seem to have such a philosophical reason for existence and continues to drive some of the most obtuse actions on earth.

To date, we in education must stand and face the facts that we have educated our specie and that of thousands of others to a point near extinction. Once education led development, but in recent years it seems we have become slaves of the dollar and those that monopolise it.

Brave initiatives and brave leadership is needed to turn the impact of the human race on this planet into something positive. It is possible to do this through our education system and it's worthy, and responsible, and ethical, and common sense, but the question remains do we, the 'educated first class elite' have the guts to do it.

It is time to hit 'reset' ourselves, because as we wait, procrastinate and make iterative piecemeal contributions, the ecosystem is doing it for us, her way.

Bionotes:
Dr Logan Muller's background spans work around the world from Europe to Africa, Asia to Latin America and the South Pacific to mainland US. His qualifications cover environmental engineering, international business, and a PhD in Sustainable Practice supported by hands on experience in China, India, Africa, South America and the South Pacific. Dr Muller's expertise is empowering disenfranchised communities to regain their grip on community and environment lost through "progress and development" by western standards. Logan's Ph.D. is in socially and environmentally sustainable business. He has implemented his research and development model in NZ, in the remote areas of the Andean mountains and in the slums (favelas) of Brazil.

Dr Muller has dedicated his life to empowering people, predominantly in developing countries, to question what the developed world terms as progress. His experiences and message sparks people to look at truly sustainable practices of centuries old cultures for clues to where we should really be investing our technology and education focus.

His message to developing regions is two fold:
1. Hold onto traditional practices that have proven to serve cultures for centuries and use technologies to enhance rather than replace these practices.
2. Before buying into paradigms and practices of "development" or "progress" ask "by whose metrics are these being measured and what benefit will be served to the fabric of society and environment".

SECTION TWO - REFEREED PAPERS

Allinson, M., Khon Kaen University, Thailand

Directions for Change in H.E. in The Mekong Region: Pasts-Thinking to Futures-Thinking, and City Universities to Village Colleges

Martin Allinson

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ABSTRACT

Written by a retired university and college engineering teacher, who (at 73) is now Khon Kaen University's oldest student, doing a PhD study of Sustainable Development's Curriculum Effects, the paper is directed primarily to young members of faculty who are looking forward to their careers in universities as those universities will be in the future.

The paper provides a challenge to universities in response to geopolitical change. While at first glance the scenario of global resource depletion and impact on the local Mekong Basin community presents a depressing picture, the paper provides an optimistic option based on forward thinking led by proactive thinking by educational leaders.

The paper briefly describes the learning that its author derived from studying with the Hawai'i Centre for Futures Studies in 2006 and how, in 2007, that study affected his MA study of forthcoming reverse migration back to North-eastern Thailand in response to geopolitical change. It then looks at how this affects higher education institutions in the Mekong Region.

The paper argues that universities and colleges have inherited a pre-disposition to be reactive to the pasts of their societies, as opposed to pre-actively preparing for the futures of their societies. It points out that higher education institutions need to change their thinking in the 'business planning' part of their development plans now that we are at the 'tipping point', when the industrially-developed nations (or parts of nations) are making the transition from increasing energy availability to decreasing energy availability. It explains the background to the 'tipping point', its geopolitical effects and the consequent national effects of energy depletion. It offers a scenario in which it is feasible that the areas comprising the Chao Phraya and Mekong Basins, led by their higher education sector, may lead the world in successful, peaceful, adaptation to the changed circumstances.

That is a scenario that is more optimistic than most that could be constructed, and examined and found to be feasible. The scenario's feasibility depends on forward-thinking intellectual leadership taking advantage of the particularly advantageous circumstances of the Chao Phraya and Mekong Basins.

Keywords: Mekong Region, sustainable development, energy depletion, universities, migration, cities, villages

INTRODUCTION

The Geo-political Emerging Issue of Present Times

Bland words often mask a revolutionary demand. For institutions of tertiary-level education, the words of the UNESCO Portal say: "Higher education for sustainable development has come to be seen as a process of learning how to make decisions that consider the long-term future of the economy, ecology

and equity of all communities". Consequently a key task of higher education has become the development of capacities for such futures-oriented thinking in faculty members and in students.

These bland words make a revolutionary demand. Not a demand to revolt, but to revolve our thinking through half-a-revolution and look forward instead of backward.

Traditionally, higher education thinking has been reactive, not proactive. Universities, as 'communities of scholars' in past centuries, have concentrated on bringing pasts to their presents (though Malthus (note 1) in his 'Essay on the Principle of Population' is a notable example of a member of faculty who did think ahead). Modern universities, seen by economic anthropologists as 'institutions for the certification, creation and recreation of the middle class' (note 2) have been reactively responsive to the demands of employees (particularly faculty), employers and governments (and, even, occasionally, students), but these demands have essentially been requests to make changes to reflect developments of recent pasts. The culture of Ancient Greece set a pattern that has endured.

The futures of all individuals, groups, communities, nations and multi-nations are extensions of their pasts. Preparing the young to take part in the continuance or dis-continuance of established trends should therefore be an essential part of the work of a university, as implied in the words of the UNESCO which are quoted above. But as well as established trends (which may be threatened by reversal, or may need to be reversed) there are also emerging issues. In slow-moving times, the young can be left to cope in their career years with emerging issues, as and when they emerge. Malthus pointed to the fact that an issue (hunger) would emerge if two established trends continued. These trends were rooted in the tendency for population to expand exponentially and for food production to expand only linearly. He could not foresee that the mining of coal, and subsequently ores and other fuels, would enable massive expansion of food production and, so, delay for two centuries the emergence of the issue that concerned him.

It is the contention of this paper that the fundamentally-important emerging issue of the early part of the twenty first century CE (the later part of the twenty fifth century BE) is that such big and easily-won discoveries of deposits of exosomatics (fuels and ores from within the body of Earth) are no longer forthcoming. The development of capacity to think ahead to the implications of this is going to bring a big change to the service required of higher-education institutions. And it will have to be done at the same time that the universities and colleges of technology are themselves being changed by the effects of that fundamentally-important emerging issue. At present we have a large part of the sustenance of populations in hyper-urban cities being produced by a small number of mechanized agri-business 'farmers' in rural areas. That is not going to be sustainable. That capital-intensive food production, based on petrochemical-derived fertilizer, will contract, and food will not be available to sustain city populations at their present sizes. The past rural-to-urban migration will reverse into urban-to-rural migration (and there are signs that, in Northeastern Thailand, this has already started, as some men who had intended to return to their taxi-driving in Bangkok after visiting their village families for the April 2008 Songkran holiday are reported to have decided, on economic grounds, not do so). That emerging issue's second main effect is that the frenetic travelling about by motor bikes, cars, buses and aeroplanes of the recent past is not going to be any longer affordable. Hence the two parts presaged by the title of the paper: the re-orienting of academic thinking from thinking about pasts to thinking about futures-as-extensions-of-pasts, and the re-organisation of city universities into federations of village colleges. When its students can't come to the university, the university will have to go to the students.

Theoretical Framework

Although the scenario of the Mekong Region countries leading sustainable development emerged, as described later, from a 'bottom up' consideration of the future of the villages of Northeastern Thailand, a 'top down' theoretical framework of five stages can be constructed. First, historically, industrialization developed after the discovery of easily-available coal deposits and mineral-ore

deposits in Britain. The steam engine, invented by Newcomen and immensely improved by Watt, enabled water to be pumped from mines and, so, huge deposits that lay below the water table could be extracted (the 'Industrial Revolution'). Secondly, discoveries of oil and natural gas, particularly in America, led to the petrochemical developments, particularly inorganic fertilizers and cheap shipping and transportation. Third, large urban populations could be fed by a small number of highly-capitalised food-producers in rural areas. The attractions of urban life and specialized occupations have resulted in hyper-urban cities, with their intensive usage of energy. The cities are dependent on food inputs that are themselves dependant on the easy availability ('cheapness') of natural gas and oil. Fourthly, as that easy-availability ceases, the industrial developments, particularly the cities, gradually cease to be sustainable and only a much-smaller proportion of populations will be able to be supported in cities. Fifth, areas or regions that will find it less difficult to cope with these inevitable changes will be those that still have a substantial rural population practicing the necessary broad range of skills in mixed farming and peasantry. The Mekong Region countries (Thailand, South-West China, Myanmar, Laos, Cambodia and Vietnam) make up one such area.

Pasts-presents-futures

A powerful message emerges if, as in figure 1, we plot the availability of exosomatic ('taken from within the Earth') fuels and feedstocks over 4000 years, spanning approximately 120 generations.

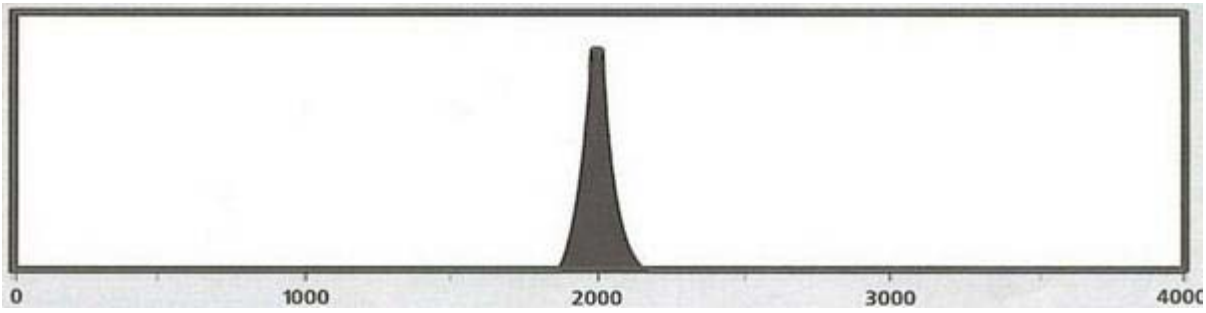

Figure 1: The usage of exosomatic fuel from 0AD (543 BE) to 4000AD (4543BE)

Alternative captions for Figure 1 could be "The Extraction of the Exosomatics", or "The Removal of the Earth's Accessible Stores".

In Figure 1, the baseline is the 4000 years from OAD to 4000AD. That is, the past 2000 years and the next 2000 years to come.

The curve shows, in smoothed and stylized form, the fuels and ores that have been and will be extracted from within Earth. [note 3] The historians of the future may well look back on this industrial period and, by analogy with electronics, describe Figure 1 as "The Exosomatics Pulse".

Coal was the first major, primary fuel of industrialism. It is still the main primary fuel for the secondary-energy supplies of electricity, though it has been supplemented by oil and natural gas where that has been more convenient. For transportation and shipping, coal has been superseded by oil. However, as depicted in figure 2, coal will outlast oil and gas for use as fuel.

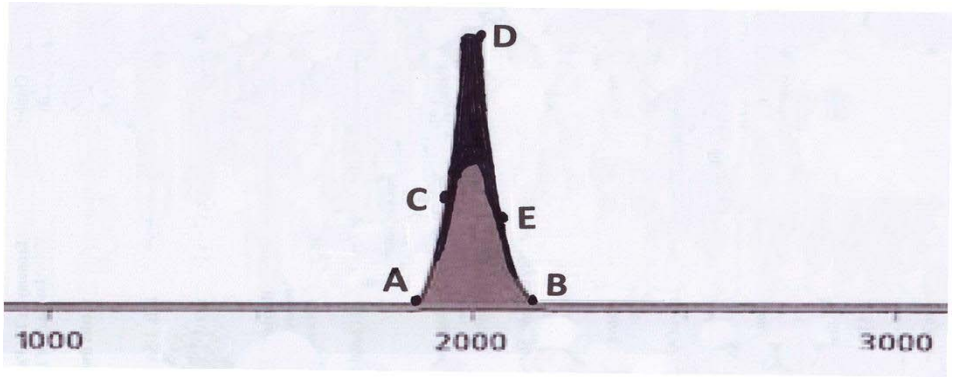

Figure 2: Coal (gray) with oil and gas (black)

The times, in figure 2, before point A can be called "The First Sustainable Age". The quantities of exosomatics extracted were very, very small. A little coal was mined from shallow pits in China, and small amounts of iron and bronze were smelted (using wood as the fuel) in places such as Ban Chiang. However, the total quantities were infinitesimal when compared to the quantities extracted in the last 200 years in the forms of coal, oil, natural gas, uranium, iron, copper etc. These exosomatics ('matter from within the body of Earth') have now been depleted to the point where supplies are becoming harder and harder to win. In whatsoever way we measure 'price', they are going to be more and more 'expensive' and less and less will be 'available'.

The period from A to B is the "The Industrial Age", with wood, coal oil, gas and uranium as fuels.
It is usual to concentrate attention on oil as its supply has become so crucial to modern lifestyles in which travelling around has become such a big part. But the consequences of the depletion of the 'finds' of natural gas merit even more attention. As so much of the food for the urban masses is produced by modern farming methods that depend on massive inputs of chemical fertilizer, for which the feedstock is natural gas, that reduction in natural gas will cause shortage of food.

Families can survive in their entireties without anybody travelling, but not with anybody without food.

The times after B can be called "The Second Sustainable Age". Their energy sources can be expected to be wood and hydroelectricity, with possibly some small, intermittent contributions from wind and/or wave and/or solar generation.

In both figure 2 and figure 3, C marks the start of the author's career.

D marks both the end of the author's career and the start of the career of today's young graduate.
E marks the end of the career of today's young graduate.

Figure 3, in a stylized and smoothed way, illustrates the 'progress' of the 'price' of exosomatic fuel.

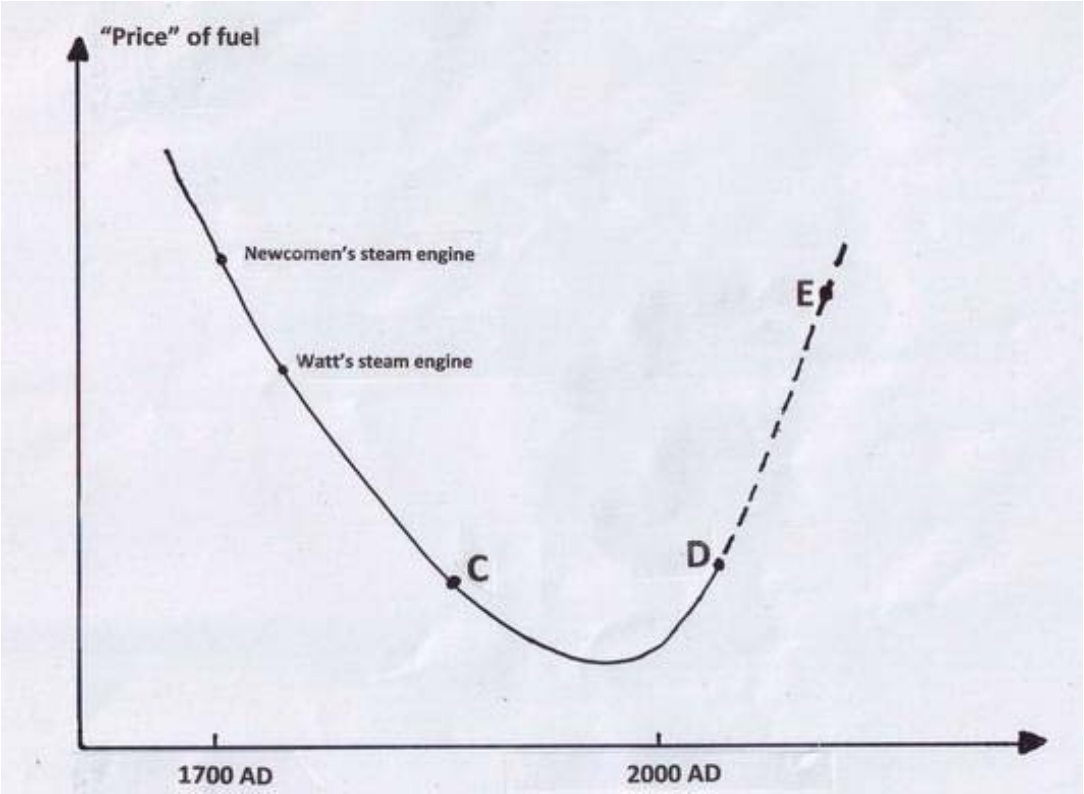

Figure 3: The 'price' of exosomatic fuel

Note that the curve in figure 3 ends, just after E. Coal, oil and gas won't have run out, but the amounts being found will be so low that they will not be used as fuels. They will only be used as feedstocks for high-value and essential commodities such as pharmaceuticals.

Sustainable development is usually defined as "Development which meets the needs of the present without compromising the ability of future generations to meet their own needs" [note 4]. It prompts us to think in terms of more than years or decades, but in generations. It also prompts us to recognize the interdependence of economic, environmental and social development. No proposed development can be called sustainable unless it is economically and environmentally and socio-politically sustainable for both the present generation and for future generations.

This paper is concerned with how the service of universities in the Mekong Region may change to match the needs of the next generation as they study in their times, as those times can be expected to then be. A scenario is presented of the major changes that will occur for the Mekong Region after the 'tipping point' (which is depicted as point D in figure 2). The scenario envisages reductions in the availability of energy making unsustainable, in their present size, hyper-urban cities (such as Bangkok). This will cause urban-to-rural migration. The rural population will find it to be unaffordable to travel to universities in the cities and require that university faculty members help them with their learning whilst they stay and work in their villages and district townships.

THE GENESIS OF THE AUTHOR'S SCENARIO OF 'RENEWED VILLAGES'

The Research Essay

In 2006, the author started an MA-by-research in Social Development at Khon Kaen University [note 5]. The MA thesis was to be a study of how the small proportion of village daughters who intend to retire with their Western husbands to their girlhood villages in Northeastern Thailand may have large effects in their villages that are quite disproportionate to their small numbers. It clearly required that consideration be given to the conditions in the villages **as those villages will then be.** So the author took an on-line 3-credit course, "Introduction to Futures Studies", offered by the University of Hawai'I [note 6]

The first assignment required a 500-word essay describing a scenario of 'What my community will look like in 30 years from now'. The author's essay opened with:

'*My community lives in a small, compact village of about 200 houses in rural Northeastern Thailand. Through the lens of a camera it will look much the same as it does now in 2006, or would have done, a century ago, in 1906. But 'seen' from the point of view of the social scientist, it will 'look', demographically, quite different from now, as much as it now looks different from 1906. As a result of economic happenings far away, its demography in 2006 is significantly different from 1906, and will change again before 2036.*'

The essay continued by quoting Prince Damrong's description of an Isaan village in 1906 [note 7] and told how the only major difference to be seen in 2006 was that the population of the village was now largely just grandparents and their grandchildren. The parents were away working as economic migrants and sending remittances that enabled the children to receive secondary and tertiary education.

The essay concluded with:

'*I predict this "return of the parents" .... by extrapolation from the state of the world economy, now, in 2006. The bubble is bound to burst.*

America cannot finance US$800,000,000,000 ($800 billion) trade deficits by borrowing the savings of the Chinese (and some other nationalities) indefinitely.

The dollar will tumble.

In the resulting recession, many Western workers-with-the-hand-and-brain will become unemployed with the collapse in demand.

Since they will start the recession in credit-card and mortgage debt, the recession will become a Depression (psychological, as well as economic).

The tumbling dollar will trip up the euro and the pound.

Hopefully the globalised world's edifices of fiat currency will be only shaken, not stirred to the extent of collapse.

Thailand will be fortunate, in that, when its factories shut for lack of orders, ***the workers can come home to their villages.***

There is enough land that even ***many city families can move to rural areas and re-start the peasantry of their great-grandparents. So self-sufficiency, with some rice for export, can come again.***

And Prince Damrong's words, of 1906, will again describe my community, in 2036.

But it will then be a village of educated peasantry, conscious of its need to maintain its sustainability.

And it will provide ***a blueprint for others to emulate, on the international scene.'***

The Research Thesis

The part of the MA thesis that examined the likely future conditions in the villages then became a search for supportive and/or negative evidence that had bearing on that scenario that had been described in the essay for Hawai'i. This required wide reading, particularly of the sources listed in the Bibliography attached to this paper.

The conclusion of the thesis says: "A scenario was postulated that the proportions of the Thailand economy, which consists of the foodstuffs production in the rural agrarian villages and the manufacture and consumerism of the urban areas, will change over the next one, two, and three decades, as consumerism becomes less and less sustainable. The scenario concluded that the villages will experience inward migration from the urban areas and that the village daughters who return from the West will add to that. The study then examined the feasibility of that scenario. As no contradictory evidence was found and considerable supporting evidence was offered, it appears that the scenario is a feasible one."

THE BIG, CHANGING PICTURE

Thailand and the other Mekong Region countries are fortunate that they can provide shelter, food, pleasure, and some mobility to their populations in the present industrial/agricultural age, in the coming transitional period, and in the later post-industrial age when exosomatic energy will no longer be available. For instance, in Thailand as it is, at present, it appears that about 60% of workers and peasant-farmers are engaged in agriculture, 30% in manufacturing and service activity, and 10% in tourism. That can, with reverse migration, undergo the change to 90%, 8%, 2% quite easily, provided that proper preparations are made early enough.

Manufacturing might hold up to slightly more than 8%, as the surplus rice of the peasantry may enable them to afford to buy more manufactured goods.

2% employed in tourism may be an over-estimate for the times when the ability to fly in tourists has ceased to exist. However these caveats make little difference to the percentage that will be engaged in agriculture. That figure will lie in the range 75% to 90%.

The villages can become 50% bigger without excessive economic, environmental, or socio-political strain, provided that what is happening, and why, is generally understood by all people in all the walks of life, and that those in a position to take advantage of the circumstances to exploit their fellow citizens forgo, or are forced to forgo, their opportunity.

Thailand and the other Mekong Region countries have not gone so far, or for so long, into consumerist-industrialisation that they cannot go forward from it in good order. Countries that are deeper into consumerist-industrialisation and have been there longer (for more than two generations) will have a much more painful transition. [note 8]

Having ascertained the conditions at time B, and knowing the conditions at time D, the social scientist can examine any sustainable (i.e. economically, environmentally, and socio-politically acceptable) 'system' for feasibility. What 'system', or economic and social development structure, is adopted out of those which are feasible will then be decided by the workings of the political structure.

But the transition from D to B will take place. All that the workings of the political structure can change is how well, or otherwise, the transition is managed.

Different countries and nations, and different areas within countries and different groups within nations, are going to have different experiences as they pass through the Second Transition or the Industrial and Global Devolution. (Hence the plural adjective in the term 'Futures Studies'.) But they will have one thing in common: some lesser or greater amounts of the devolution of power (economic and political) from their urban industrial areas to their rural food-producing areas. A major facet of this big, changing picture is therefore the dispersal of the 'middle class' from its present heavy concentration in cities to a more even spread throughout countries. However, with the internet, the members of its various 'communities of practice' will be more closely in touch than ever before.

Professional Skills for Sustainability

The author first experienced the later part of the 'leading edge' of the exosomatics pulse, and the phenomenon of rapidly-increasing industrialization. Then he experienced the 'flat top' of the pulse.

Now he sees young engineers and other young professionals having the different, but equally exciting, prospects of the rapid changes associated with the 'trailing edge' of the pulse, followed by the slowing changes leading towards the final 'steady state'. Since 50% of today's young people can be expected to live to 100 years of age [note 9], many may also experience the first decades of that 'steady state'.

The steady state after the pulse will be very different from the steady state before the pulse. The First Sustainable Age was a static one, with very small and compact towns and cities in which everything had to be within walking distance, populated by people with little information. The towns and cities of the Second Sustainable Age are likely to be linear areas of low-level buildings, maintained from today, lying within cycling distance of an electrified railway. The rich villages are likely to be those on fertile lowlands (who will have surplus food to trade for luxuries) and those in the hills who have energy from a micro- or mini- hydroelectric system on which they have been able to base a small-scale industry, producing high value products. The rich cities will be those that host essential services, in return for which services the food-producing populace will feed them. The city communities will need to have been successful in demolishing unsustainable high-rise buildings and re-using the recovered materials.

Villages, towns, and cities will need engineers and other professionals with the character and expertise to be proactive in being prepared to improvise to keep systems operating for longer and longer, rather than just specifying, purchasing, commissioning and maintaining new systems and equipments. The professional skills that will be marketable will be very different from the ones that are marketable today.

The Chao Phraya and Mekong Basins in the GMS (Greater Mekong Sub-region)

This paper postulates that there are areas which enjoy favourable circumstances that can (though not necessarily will) enable them to adjust and transform to their versions of the era of the Informed Peasantry more quickly and less traumatically than areas and groups that have been industrialised, or partially industrialised, for longer. One such area is the North and Central parts of Thailand that comprise the area drained by the tributaries to the Chao Phraya river, and Northeastern Thailand (Isaan) with the parts of Vietnam, Cambodia, Laos, and South Western China that comprise the Mekong Basin. The total population of this rural area is of the order of 90 million at present.

Although some parts grow different crops from other parts, the common and crucial features of these basins are their high proportions of self-sufficiency in household, village, and regional terms and their freedom from the pressures of excess population. They can absorb substantial urban-to-rural migrancy as the urban areas reduce in population in response to the reduction of the ability of urban areas to be fed by trucked-in food from their hinterlands.

The Magnitude of Rural-to-urban Migration

Drawing on the facts and figures given in a case study of Bangkok (note 10), an estimate can be made, for Thailand, of the permanent rural-to-urban migration that has occurred and the temporary migration flows that still occur. Of Thailand's 60 million population, approximately 20 million are registered as living in the urban areas and 40 million in the rural areas. Yet, since 1990, the net increase in rural population has only been 0.3 million, whilst the net urban population has increased by 15 million. It appears that, out of about 13 million of working age who are registered as living in rural areas, some 5 million (3 million men and 2 million women) are away from their villages at any one time and working in the industrial areas of the Eastern Seaboard or Bangkok. Thailand's 70,000 villages have an average population of 600 people, and on average, in the average village, 70 of the 200 who are of working age will be absent, earning wages in industrial factories or commerce and sending remittances to their parents and siblings.

The Problem of the Size of Bangkok

There is one area that differs significantly from the other areas of the two river basins and that is the hyperurban, primate city of Bangkok. As it is, with its infinitesimal sufficiency, Bangkok would become increasingly unsustainable through the 'declining oil' initial period of the Second Transition.

But it is possible to be optimistic about a Bangkok of the future being environmentally and socially much improved. At present it is a lovable city, and could become twice as lovable by halving its population over the next twenty years. It only requires an average reduction of between 3% and 4% per annum for a population to halve over twenty years and halve again over the next twenty years. If, each year, the returnees after Songkran were that little bit less in numbers than the exodus before Songkran, the reduction could happen smoothly. Figure 4 shows this reduction, starting from the present 10 million (7 million registered residents, and 3 million temporary migrants). There are signs that this started in 2008, though there are, of course, no statistics or survey-reports, as yet.

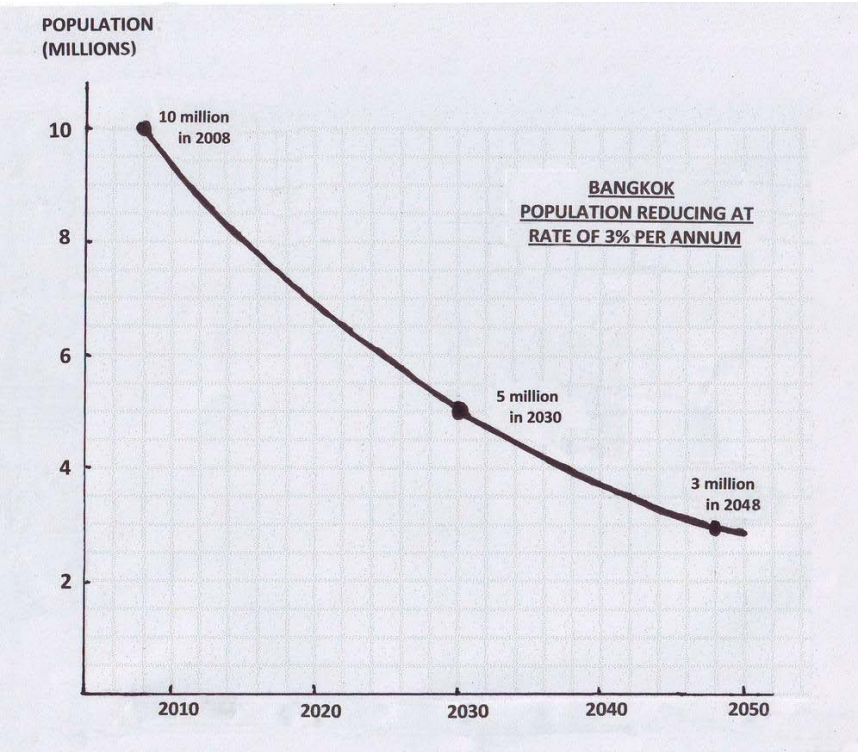

Figure 4: Bangkok's population reducing at 3% per annum.

To give it adequate sufficiency all that is required will be for the new, smaller population of Bangkok (maintaining the seat of government and the port that exports the surplus rice and imports the luxuries) to grow a proportion of their food in their spare time from their official duties. As Golf Clubs morph into Allotment Associations, so will Bangkok increase its sufficiency. Perhaps some players are already practicing digging up the fairways to grow vegetables, judging by their divots.

Jesting apart, though, such a transition to part-time peasantry by city dwellers is not unknown. The recent example (recent enough to have been experienced by the author in his boyhood) was the Dig for Victory campaign in Britain's cities when their incoming supplies of food were reduced by increasing enemy submarine-warship activity in World War II. In the coming War on Want, though, the impetus will be reduction of submarine-mining activity (and subterranean-mining activity), through depletion of reserves.

For Bangkok to reduce its population by, say, 75% over 40 years is going to require far less change, though, than that needed for American suburbs to change to a regime of sustainable sufficiency. Hence the author of this paper can be more relaxed than James Kunstler. [note 11]

IMPLICATIONS FOR PROVINCIAL UNIVERSITIES AND FACULTY MEMBERS

Provincial universities, like their capital-city brethren, have functioned with the 'business model' that they took in young, able people from rural and urban areas and trained and 'certificated' them for progression to specialized professional roles in industrialised, urbanised societies. In particular, the universities had in their libraries material for study that was unavailable elsewhere. They have evolved curricula, and their faculty members have developed specialized expertise, that reflects those 'career destinations' of their students. The provincial universities have been instruments of rural-to-urban migration, in which young people from rural areas largely 'left their parents' indigenous knowledge behind them' as they acquired the appropriate employment and social skills for their urban futures.

However, in a scenario in which decreasing availability of exosomatic energy is causing contraction of industrialism and urban-employment opportunities, the provincial universities will have to change to a different 'business model'. The 'career destinations' of the majority of their graduates will be the villages and district townships of the rural areas, where the graduates will have wider and less-specialised roles. The curriculum needs of the students, particularly those from the urban areas who are in the process of migration to rural occupations, will be quite different from anything hitherto provided by universities.

To rise to the occasion, when the students need something different from what we are used to doing, is challenging. Nevertheless, the need of the times will be to help the next generation of young professionals to develop the courage, confidence, and competence to deal with the wide range of tasks that may come their way in public or private practice in rural and municipal areas.

Young university teachers need to move towards the multi-disciplinary and trans-disciplinary in their research activities so that they become prepared to meet the requirements of their jobs in the future.

At the same time, the universities will have to adapt to the decreased ability of their students to afford residence at the university or to afford daily travel to its city location. Fortunately, information technology allows for transmission to the homes or workplaces of the students all of the material for study, and for students to return the results of their work on the study materials. Communications systems require relatively little energy for their operation and can be expected to benefit from innovation and permit greater interaction between students and their classmates with their teachers by video mail and video conference.

Some attendance at the university campus will still be required, though. The social role of the university in the development of young people does require their face-to-face interaction, and so does the acquisition of the skills of presentation to a live audience. With adaptation, the methods of the Open Universities, with their home-based study plus attendance at Summer School, may come to be followed. But there may also be echoes of the former Day-Release and Block-Release study provisions for student apprentices in the way that universities respond to the more frugal times in which their students will be living.

It is possible to envisage Universities that are 'federations of village colleges', employing a relatively low number on their present city campuses and with most of their academic staff resident in the villages, where each acts as the mentor and facilitator to students on a wider range of courses than present-day specialist academics are concentrated on. A medium-sized village might have three university staff members, dealing respectively with Technology, Sciences, Humanities and Commerce. These village tutors with the demands of such wide remits would be senior members of their University's Faculty. They would maintain close liaison with their Faculty contacts, at other villages and at the central campus by communications much developed from those of today. Bigger villages might have more than three tutors in residence, and in smaller villages the academic staff might have dual appointments to the university and to the village secondary school.

Pre-active Preparation

Preparation for any activity starts with thought that proceeds to the imagining of scenarios of how the activity may develop. Preparing populations for the changes that are to come in their economies and societies must precede such restructuring, and that must start with getting all the individual members of the population thinking ahead. The popular entertainment media need to be enlisted to provide 'info-tainment' and 'edu-tainment' in the form of 'social-science fiction' popular programmes that show the changes of the near-future being coped with. But the authoritarian agencies, particularly the schools, technical colleges, and universities, must be enlisted, too.

Preparing students and consumers for what is expected to be their future has always underpinned curriculum development and marketing. But it has been a primarily subconscious process in the past. That is, industries and education have been reactive to the changing circumstances brought on by the easy discoveries of more exosomatics. Now it is conscious pre-action that is required.

On the industrial front, there has been a false start in the Drive on Ethanol programme, primarily because the scenario was not thought through sufficiently thoroughly. That is hardly surprising, given that the political decision-makers and their technocratic advisers are the products of the reactive former times of increasingly-available resources. They subconsciously followed the established trend of "Get Growth", without realising that it had been overtaken by the emerging issue of "We must manage with less". But now that we see that 'GDP' is better described by the acronym of 'Grossly Delusional Parameter', perhaps we can get on better paths.

The educational systems that have channeled the brightest and best from the rural areas to the urban areas and so robbed the villages of their 'middle class' have outlived their usefulness and need to prepare to turn around. That is no small order. It is hard for academics to teach anything other than what they were taught themselves; but the academic's duty is to help students to prepare for what will be their lot. When it is clear that that is no longer the same thing as their teacher's past, then the member of the teaching profession must change accordingly---or fail in his/her professional duty.

SUMMARY AND CONCLUSION

The need for economic sustainable development can be expected to cause a change from the intensely-specialized activities of the immediate past. In some ways the appropriate technologies and innovative methodologies of the frugal and thrifty previous times (up to about 1960) will become relevant again, but in a new scenario. Nothing is going to be uninvented, and all the skills that need to be applied in order to eat and be sheltered adequately are still being practised in rural areas, and this indigenous knowledge can be studied and passed on.

The role of the professionals will be that of informed professionals in informed societies, helping their societies to move forward through the transition from the age of industrialized consumerism to the Second Sustainable Age. World-wide, members of faculties in the universities, using modern information technology and innovation in their course and curriculum development, are the 'front line troops' upon whom the success of the campaign to achieve sustainable development depends. But who will lead the world's front-line troops? Feasibly, it may be the universities and colleges of the Chao Phraya and Mekong Basins, if their staffs have the confidence and courage to think ahead, prepare themselves and act pre-actively.

NOTES

1. The eminent political economist, Professor Thomas Robert Malthus published six editions of his 'Essay on the Principle of Population' between 1798 and 1826.

2. This, possibly somewhat provocative, description of universities is to be found in " Chayanov and Theory in Economic Anthropology" by E. Paul Durrenberger and Nicola Tannenbaum, Chapter 7 of Theory in Economic Anthropology, edited by Jean Ensminger, 2002, AltaMira Press, Maryland, USA.

3. The ordinate axis of Figure 1 has, deliberately, no scale. Figure1 is the graphical presentation of a concept, not of a table of figures. If the concept is used to plot any particular quantity, the pulse can be expected to be narrower or broader, shifted left or right by a few years and made irregular by fluctuations in demand for the commodity, caused by economic conditions due to wars or recessions. However, the plot for any exosomatic quantity will not look substantially different from Figure 1.

4. This is the original definition proposed in the United Nations' World Commission on Environment and Development (WECD) report in 1987 that was entitled 'Our Common Future', but is usually known as 'The Bruntdland Report'. The full report can be downloaded from http://www.worldinbalance.net

5. This research is reported in Allinson M. V. 2007(1) The Return of the Village Daughters. Unpublished MA thesis, Khon Kaen University, and in Allinson Martin Vernon 2007(2). The Return of Village Daughters from the West. Journal of Mekong Societies, KKU, Vol 3, No 3, September 2007.

6. This on-line course, numbered POLSC171 is available for study, either for credit, or not-for-credit. See: www.futures.hawaii.edu/syllabi/171Fall03.pdf. The author's experience was reported in a paper: 'Stage 1 for an apprentice futurist: A retiree, undergraduate, on-line, triple-cross-cultural learning experience', at the Conference: "A Legacy of Learning: Sharing global experiences in later life", University of Strathclyde 7-11 May 2007. Available at: http://www.cll.strath.ac.uk/legacy/index.htm

7. A translation of this part of Prince Damrong's report is to be found in the book "The Thai Village Economy in the Past", by Professor Chatthip Nartsupha, translated from the original Thai edition of 1984 and with an extensive Afterword by Chris Baker and Pasuk Phongpaichit, 1999, Silkworm, Chiang Mai.

8. There are many websites that discuss how Western nations may, or may not, cope with the transition. A good starting point is www.lifeaftertheoilcrash.net Some of the contributions are tendentious and allowance must be made for hyperbole. Nevertheless, the website does provide food for thought.

9. A recent extrapolation of life-survival rates and calculation of the corresponding age-of-death expectations was found in an article "Half of 30 year olds to live to 100---research" at http://www.ifaonline.co.uk/public, accessed 10 July 2006.

10. This case study was found at www.water.tkk.fi/wr/tutkimus/glob/publications/Haapala/pdf-files/CASE%20STUDY%20OF%20**BANGKOK**.pdf, accessed 07 October 2008.

11. A summary article of Kunstler's book "The Long Emergency" can be found at: http://www.rollingstone.com/news/story/7203633/the_long_emergency

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Measuring Service Performance, Student Satisfaction and its Impact on Student Retention in Private, Post-Secondary Institutions

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ABSTRACT

With an ever growing assortment of educational options, students seek institutions that will provide for them a unique educational experience that they will remember for a life time. In addition, the present student is a customer seeking an educational program that will prepare him/her for a successful career and gainful employment. Since institutional budgets are developed based upon projected enrolments, it is becoming crucial for private institutions to retain the students they recruit. This situation has created a need for continued research in the area of student satisfaction and student retention. A reduction in student numbers, therefore, leads to a reduction in budgeted funds available to operate, maintain, and grow a private institution.

The purpose of this study is to add additional contributions to the body of work on service quality, satisfaction, and student retention in higher education. This study attempts to show the relationship between service expectations, service performance, student satisfaction, and salient student retention constructs hoping to shed new light on the research question: Is there a significant relationship between service quality, student satisfaction and student retention in higher education? The results show that there are significant relationships between service performance and student satisfaction that will aid private, post-secondary institutions to predict and measure student satisfaction and retention.

INTRODUCTION

As academic and educational options increase, students seek institutions that will provide them with unique, memorable, and personal educational experiences. Also, today's student is a customer seeking an educational program that will prepare him/her for a successful career and gainful employment. Because institutional budgets are developed based upon projected enrollments, it is becoming crucial for private institutions to retain the students they recruit. In fact, studies have shown that decreased budgets can have an effect on student retention (Ryan 2004). An institution's inability to maintain its enrollment numbers impacts its graduation and retention rates – indicators of performance for higher education institutions (Titus 2004). This research examines students' expectations and the service performance that they perceive within their respective college or university and its impact on student satisfaction and retention. Past research (Parasuraman et al. 1990; Cronin and Taylor 1992) has shown the importance of knowing what the customer expects is the first step in delivering service quality and satisfaction. Adherence to that principle would result in increased satisfaction and increased retention. Increased retention will allow an institution to realize substantial savings (Sydow and Sandel, 1998).

Higher Education has experienced some dynamic changes over the last twenty years. In addition to the number of non-profit institutions that offer a myriad of degree programs and levels of instruction, virtual institutions, such as the University of Phoenix, and for-profit institutions, such as Argosy University, have entered into this competitive environment vying for the diminishing pool of students and resources needed to implement effective academic programs (Sevier 1998; Breneman 2005). A large amount of a college admissions budget is spent to recruit freshmen, and therefore, it has become necessary to retain these freshmen through their graduation/ degree completion as dictated by the

standards of academic progression for the institution (Lau 2003). While many strategies have been developed and used by both administration and faculty, attrition levels have grown over the years in higher education (Tinto 1987; Sydow and Sandel 1998; Braunstein et al. 2006). This situation has created a need for continued research in the area of student satisfaction and student retention.

Since many private institutions do not enjoy access to large endowments, they are driven by tuition revenue (Kyle 2005). A reduction in student numbers, therefore, leads to a reduction in budgeted funds available to operate, maintain, and grow a private institution. This situation has lead to the eventual closing of some private liberal arts colleges as well as program retrenchment in many private and public institutions of higher learning (Gumport 1993). This creates not only an economic impact, but it also reduces the amount of institutional options for the student (Kyle 2005). Now, more than ever, higher education institutions have embraced the marketing concept and the idea of the student as consumer, the customer who is involved in the purchase of higher education programs and services (Kotler and Levy 1969; Conway, Mackay and Yorke 1994; Kyle 2005).

THEORETICAL FRAMEWORKS

The base theory for this study is service quality and customer satisfaction integrated with salient constructs within student retention theory (Tinto, 1975, 1982, 1988, 1997; Bean, 1983, 1985). The importance of expectations in the customer's/student's evaluation of services has been acknowledged in past service quality literature (Parasuraman, Zeithaml, and Berry 1985, 1988; Cronin and Taylor 1992, 1994). Zeithaml et al. (1990) had made great progress in identifying and understanding determinants of service quality, satisfaction, and, subsequent, customer retention. They had also developed a service quality measurement instrument referred to as the SERVQUAL survey. In an academic setting, SERVQUAL has been adapted and used primarily to evaluate the service quality of college/university libraries. There is a wealth of literature that reports the invaluable information gleaned by academic libraries using satisfaction surveys to assess their services (Edwards and Brown 1995; Coleman et al. 1997). SERVQUAL has already been identified as having the potential to measure service quality in a postsecondary institution by examining the gap in student perceptions and expectations within academic environments (Hill 1995; Kerlin 2000; Ham 2003).

The major constructs that measure student retention are derived from two major theories of student retention – student integration theory and student attrition theory. Student Integration Theory is derived from the research of Vincent Tinto. Tinto (1975) created a model that sought to describe the factors that cause a student to leave a degree program before graduation. Tinto believed that student persistence/ retention is based upon the student's commitment to the goal (graduation and degree completion) and commitment to the institution (one's loyalty to the institution) coupled with the student's level of integration within social and academic elements that make up the individual student experience. Tinto suggested that goal and institutional commitment was not enough to predict dropout. Social integration is vital, but it is not just restricted to student-peer relationships. It also includes interactions with staff and faculty on campus. Another predictor of student retention, academic integration has 'varying forms' (Tinto 1975) that relate to the level of student academic engagement with faculty and fellow students as reflected in grades, intellectual stimulation, and personal intellectual development.

Student Attrition Theory is derived from the work of John P. Bean. Bean (1980, 1982, and 1985) developed his model with more focus on environmental/external factors. These factors include institutional fit which is similar to Rootman's 'person-role fit' (Bean 1985), finance attitude or the level of financial funding the student gets from the institution or from his/her family (Cabrera et al. 1993), outside encouragement which is the support and encouragement of family and friends of the student to finish the degree program, and, as Bean (1985) calls it, intent to leave. The language was altered by Cabrera et al. (1993) to imply that the lower the scores the greater intent to leave while the greater the scores the lesser intent to leave. Thus, the lesser the intent to leave, the greater is the potential for student retention.

Because of a close comparison and overlap of the two student persistence models Cabrera et al. (1993) developed an integrated model that sought to provide a 'more comprehensive understanding of the complex interplay among individual, environmental, and institutional factors.' Ideally, it is best to examine the present behavior as a predictor of future behavior. By creating another integrated model that combines the research of Cabrera et al. (1993) and the concepts of service quality and satisfaction, the administrators of an institution of higher learning would possess a tool to adequately measure student satisfaction and retention. This would allow the institution to adapt, change, and focus on institutional quality and, thereby, experience savings derived from student retention.

STATEMENT OF THE PROBLEM

As the service sector of the United States economy continues to grow, much research is being done in the area of service quality with a focus on customer satisfaction and retention. In higher education, the student is a short-duration customer who will, hopefully, stay with his/her institutional choice for the duration of the degree program. If the institution has a graduate school, quality student experiences will beget student satisfaction creating a situation in which the student will pursue an advanced degree at the same institution. Strong customer orientation/student-centeredness will ensure strong retention numbers and nurture positive word of mouth that will bring more students. With the stakes high in the competitive higher education marketplace, it will become necessary for all institutions and their cadre of campus service providers – faculty, staff and administrators - to keep their fingers on the pulse of the students and their perceptions of the service level provided them.

METHODOLOGY

The study uses quantitative research methodology that builds on previous research in service quality, student satisfaction and student retention in order to produce results that can be generalized within institutions of higher education. This methodology discussion will address the following: research design, research model, research questions, hypotheses, sampling procedures, and data collection.

Research Design

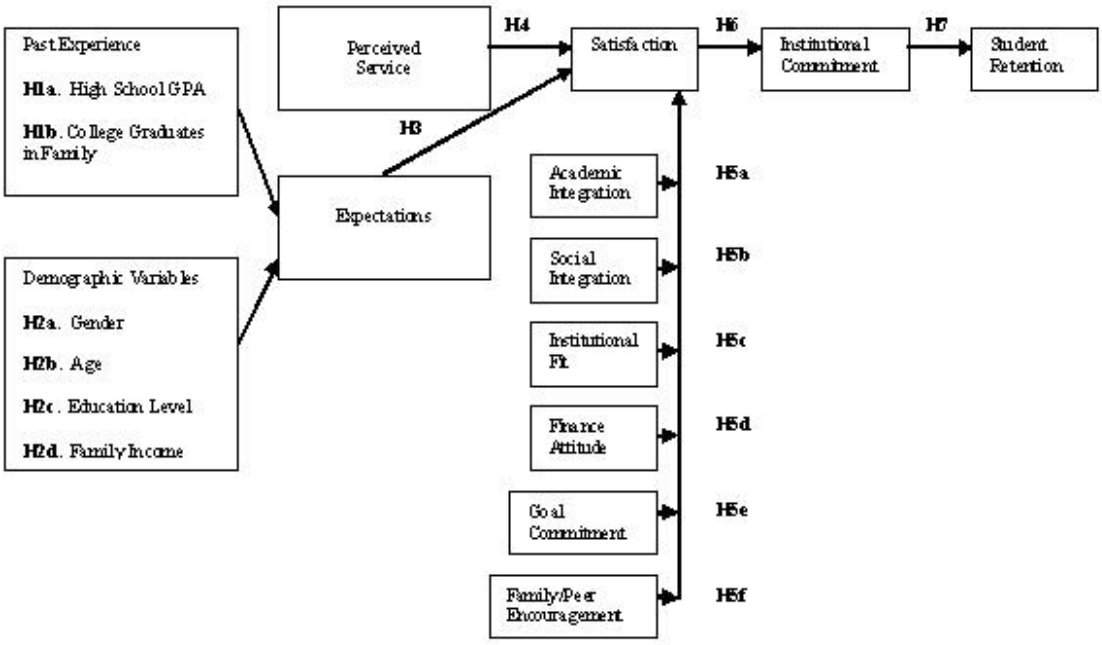
Since the focus of this study is to examine the relationships between service quality, student satisfaction and student retention, a cross-sectional survey design is used. The survey instrument includes an adaptation of the SERVQUAL survey which as Parasuraman, Zeithaml and Berry (1991) state 'is a generic instrument with good reliability and validity and broad applicability.' Resulting gap scores from expectancy disconfirmation could provide a measure of service quality from the student respondents, but instead service performance was measured (Cronin and Taylor 1992) and used. Much literature has suggested that service quality is an antecedent to student satisfaction (Cronin and Taylor 1992; Parasuraman, Zeithaml, and Berry 1985, 1988). The research design measures student retention constructs and their relationship to a student's satisfaction with his/her learning environment. Therefore, the research in this study measures service quality, student satisfaction, and the behavioral intention of institutional commitment and student retention.

Research Model/Research Questions and Hypotheses

The research model depicted in Figure 1 represents the hypotheses that will be tested in this study. Hypothesis one will focus on the influence that past experience has on student expectations of service quality in post-secondary institutions. Hypothesis two will focus on the impact of gender, age, educational level, and family income have on student expectations of service quality. Hypothesis three will examine the relationship between student expectations and student satisfaction levels within post-secondary institutions. Hypothesis four will address the relationship between student perceptions of service performance and student satisfaction. Hypothesis five will focus on the correlation between key student retention variables (academic integration, social integration, institutional fit, finance

attitude, goal commitment, and family/peer encouragement) and student satisfaction. Hypothesis six will focus on the influence that student satisfaction has on institutional commitment which is the level of commitment the student has for his/her institution. Finally, hypothesis seven investigates the influence that institutional commitment has on student retention in a higher education institution.

FIGURE 1 - Theoretical Model for Service Quality, Student Satisfaction, and Student Retention



Sampling and Data Collection Procedures

The sample consisted of students from three institutions of higher education in New England: two private colleges and one private university. The sample size was 150 students per institution for a total of 450 students to be surveyed. The student population consisted of undergraduate students in baccalaureate programs.

Data collection for this study was gathered from survey questionnaires administered to 150 students at three private academic institutions participating in the study. As with any research study students were assured as to the confidentiality of their responses, and there was no need for the student to include a name on the survey. Professors were asked to administer the surveys during the first minutes of their class session, because based on research conducted by James et al (2005, pg.4), 'in class survey administration has the highest response rate.' The response rate will be usually higher, because the professor is designating time from his/her instructional time to 'a captive audience' in a quiet and distraction-free environment.

RESULTS

The data reported is the result of the statistical analysis of 418 of 450 surveys (92.9%) collected from the three private, higher education institutions in New England.

Demographic Analysis

As shown in Table 1, the age range findings show that the majority of the students surveyed (93.5%) are traditional-aged students with 27.5% being under 20 years of age and 56% being between the ages of 20 and 23 years of age. This was anticipated since day students were surveyed, and a majority of day students are traditional-aged students.

Table 1 Gender and Age of Respondents

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	152	36.4	36.4	36.4
	Female	266	63.6	63.6	100.0
	Total	418	100.0	100.0	

Age Range

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 20	157	37.6	37.6	37.6
	20-23	234	56.0	56.0	93.5
	24-26	13	3.1	3.1	96.7
	27-30	7	1.7	1.7	98.3
	31-35	4	1.0	1.0	99.3
	Over 35	3	.7	.7	100.0
	Total	418	100.0	100.0	

Table 2 – Respondents' Financial Status (Family Income, Financial Aid, and Outside Jobs)

Family Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under $25,000	23	5.5	5.5	5.5
	$26 - $50,000	65	15.6	15.6	21.1
	$51,000 - $75,000	47	11.2	11.2	32.3
	$76,000 - $100,000	54	12.9	12.9	45.2
	Over $100,000	118	28.2	28.2	73.4
	I don't Know	111	26.6	26.6	100.0
	Total	418	100.0	100.0	

Financial Aid?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	288	68.9	68.9	68.9
	No	129	30.9	30.9	99.8
	3	1	.2	.2	100.0
	Total	418	100.0	100.0	

Hours of employment per week

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I don't have a job	137	32.8	32.8	32.8
	Under 10 Hours	56	13.4	13.4	46.2
	10 -20 Hours	131	31.3	31.3	77.5
	21 - 30 Hours	51	12.2	12.2	89.7
	31 - 40	33	7.9	7.9	97.6
	Over 40 Hours	10	2.4	2.4	100.0
	Total	418	100.0	100.0	

The results for gender yielded no surprises. Since there is a growing concern about the 'missing male' on the higher education landscape, the population for this study surveyed consists of 63.6% female and 36.4% male. The missing male concept has been tracked over the last several years by the National Centre for Educational Statistics (NCES). In a recent (2007) report, the Centre noted that women went from being a minority to the majority of the U.S. undergraduate population, increasing their representation from 42 percent to 56 percent of undergraduates (Povasnik et al., 2007). Additional data suggests that women will account for 57% of those enrolled in post-secondary programs by 2012, according to the NCES report.

Since financial support is important to a student's retention, another demographic variable, family income was observed. Table 2 shows the family income/financial aid breakdown with 12.9% of the population surveyed had family incomes of $76,000 - $100,000, 28.2% with incomes over $100,000 per year, and approximately 21.1% of the families made $50,000 or less per year. While 41.1% of the population surveyed made an excess of $76,000 per year, the cost of higher education has forced many to seek financial aid in order to complete a program of study at a baccalaureate institution. This is reflected in the descriptive data in Table 2 showing that 68.9% receive financial aid to continue their studies. Ancillary to financial aid is the student's need for additional resources. According to Table 2, almost one-third of the students (32.8%) do not have an outside job. The remaining 67.2% have a desire and a need to work.

Finally, ethnic mix of the population was observed with a consideration regarding whether a student was an international student or an American student. According to Table 3, the population surveyed was 95% American students and 5% International students. When compared with the educational research of Povasnik et al. (2007), the ethnic breakdown of degrees earned at baccalaureate institutions in 2005 was similar to the overall population ethnic background of respondents in this study with some slight increases in the Caucasian and International Student populations.

Table 3 – International Student Status and Ethnic Background of Respondents

International Student?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	5.0	5.0	5.0
	No	397	95.0	95.0	100.0
	Total	418	100.0	100.0	

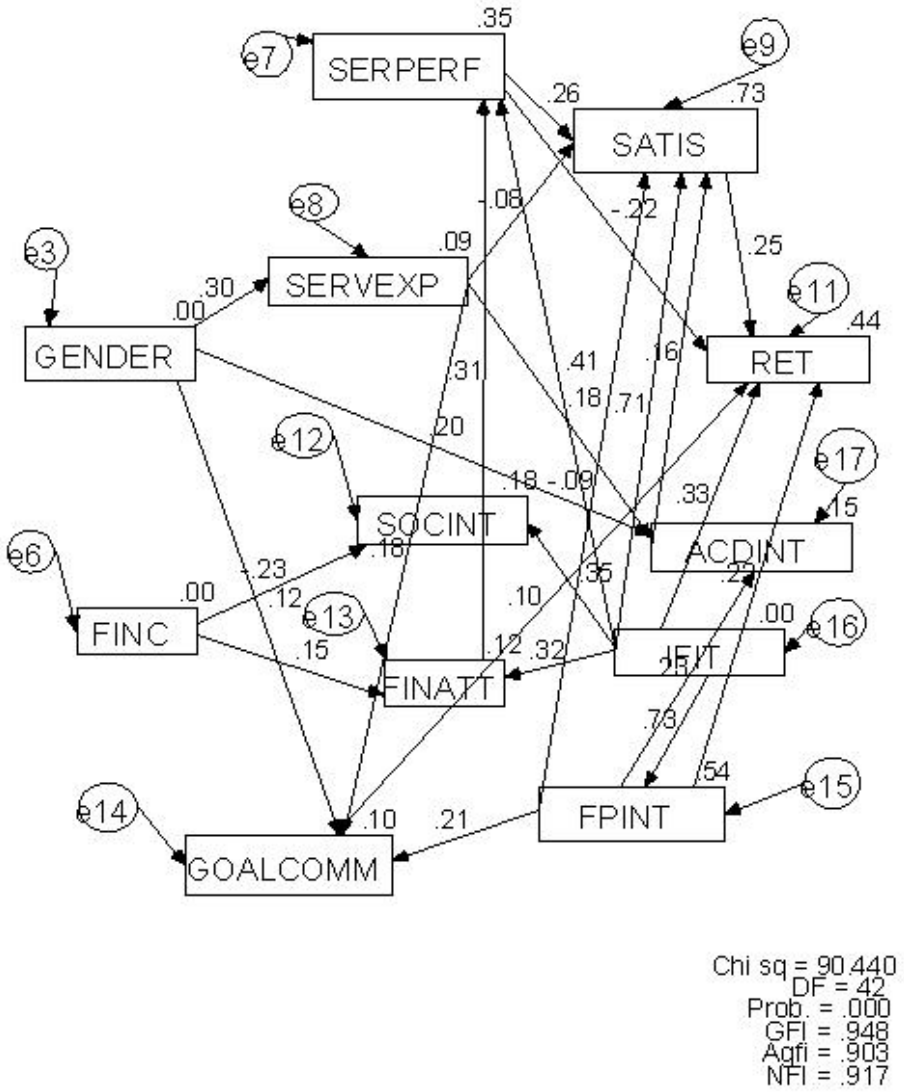
Ethnic Background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Caucasian	353	84.4	84.7	84.7
	African	16	3.8	3.8	88.5
	Asian	24	5.7	5.8	94.2
	Native American	6	1.4	1.4	95.7
	Latino	11	2.6	2.6	98.3
	Other	7	1.7	1.7	100.0
	Total	417	99.8	100.0	
Missing	System	1	.2		
Total		418	100.0		

Results of Hypotheses Testing

In order to test the hypotheses, structural equation modelling (SEM) was used. The model developed is shown in Figure 2 and standardized regression weight estimates in the model are shown in Table 4. The model included all of the significant links from the initial theoretical model. The variables that had been trimmed from the structural equation model are high school GPA, parental college attendance, age, education/class level, and institutional commitment. As the paths were trimmed, the chi square difference and the goodness of fit indices were observed and provided an improved model for the study. The resulting path diagram was the most parsimonious model and worked well. The relative likelihood ratio (chi square/ degree of freedom) of 2.15 (90.440/42) is acceptable. Due to the size of the sample, the p values are less than 0.05. Other important considerations that support the present structural equation model are the goodness of fit index (GFI) of 0.948 and the normed fit index (NFI) of 0.917. With the AGFI of 0.903, it is suggested that the lower measure might indicate some over fitting in the hypothesized model.

Figure 2 – Structural Equation Model for the Study



The coefficients presented in Table 4 are derived from the structural equation model and show the relationship between the key variables in the model. The critical ratios (C.R.) shown are like t-values. The C.R. values that are greater than 2 show he significant links in the path diagram at the $p < 0.05$ level. Therefore, all links left in the structural equation model (SEM) are significant.

Hypothesis 1

Since these variables were removed from the model, the null hypothesis, $H1a_o$, there is not a significant difference in student expectations of service quality by the student's high school GPA, fails to be rejected. For the same reasons the other null hypothesis, $H1b_o$, there is not a significant difference in student expectations of service quality by the number of college graduates in the student's immediate family, fails to be rejected. These findings contradict the theories of Tinto (1975). Over the last decade, secondary students have received a great deal of information about the college experience through options such as 'kids to college' programs and dual enrolment opportunities derived from post-secondary/secondary educational partnerships. Therefore, today's student knows what to expect in a college environment.

Hypothesis 2

Hypothesis 2 examined the relationship between student demographic factors and the students' expectations of service quality. Results of these hypotheses are shown in Table 4. The SEM results (CR = 5.102; $p < 0.05$) indicate that the null hypothesis, H2a, there is not a significant difference in student expectations of service quality by the student's gender, is rejected. This confirms the findings presented in Kerlin (2000) and shows evidence that females have higher expectations than males, and this was indicated in their individual mean scores.

Table 4 - Structural Equation Model Results and Regression Weights

		Estimate	S.E.	C.R.	P
SERVEXP	<---GENDER	.568	.111	5.102	.000
FPINT	<---IFIT	.731	.042	17.505	.000
FINATT	<---IFIT	.321	.058	5.513	.000
FINATT	<---FINC	.088	.034	2.598	.009
SERPERF	<---IFIT	.384	.048	7.947	.000
SERPERF	<---FINATT	.286	.048	6.007	.000
ACDINT	<---GENDER	.379	.110	3.441	.000
ACDINT	<---FPINT	.214	.053	4.058	.000
ACDINT	<---SERVEXP	.177	.058	3.061	.002
SATIS	<---SERPERF	.277	.039	7.096	.000
SATIS	<---SERVEXP	-.085	.034	-2.532	.011
SATIS	<---ACDINT	.169	.035	4.783	.000
SATIS	<---IFIT	.698	.049	14.157	.000
SATIS	<---FPINT	-.090	.046	-1.945	.052
GOALCOMM	<---SERVEXP	.152	.052	2.927	.003
GOALCOMM	<---GENDER	.202	.099	2.039	.041
GOALCOMM	<---FPINT	.170	.047	3.585	.000
RET	<---IFIT	.644	.183	3.523	.000
RET	<---FPINT	.453	.132	3.428	.000
RET	<---GOALCOMM	.247	.111	2.219	.026
RET	<---SATIS	.492	.167	2.938	.003
SOCINT	<---IFIT	.358	.057	6.321	.000
SOCINT	<---FINC	-.134	.033	-4.068	.000
RET	<---SERPERF	-.463	.121	-3.838	.000

The next hypothesis, $H2b_o$, there is not a significant difference in student expectations of service quality by the student's age, was not used in the SEM which suggests that we accept the null hypothesis. This confirms the research results of Ham (2003).

Since the variable student education level is not included in the SEM due to its impact on fit indices, the result for the next hypothesis, $H2c_o$, there is not a significant difference in student expectations of service quality by the student's education level, indicates that the null hypothesis fails to be rejected. This also confirms Ham (2003). Although it is present in the model, the variable family income (FINC) corrupted the model when a path was linked to service expectations (SERVEXP). Therefore, the next hypothesis, $H2d_o$, there is not a significant difference in student expectations of service quality by the student's family income level, fails to be rejected. Although Tinto (1975) stressed this as an important factor, Ishitani and DesJardins (2002) suggest that the issue of family income changes on an annual basis and rely on the individual grade levels of the students. The closer the student is to graduation, the lesser the impact of family income. However, the model in this study shows that family income has a strong relationship with the student's finance attitude and the student's level of social integration.

Hypothesis 3

This study investigated the relationship between students' expectations of service quality and student satisfaction. The results shown in Table 4 (C.R. = -2.532; $p < 0.05$) suggest that the null hypothesis is rejected and that there is a relationship between student expectations of service quality and student satisfaction. This finding contradicts those who place satisfaction before service quality (Athiyaman 1997; Parasuraman et al. 1988), but it confirms the research of Brady and Robertson (2001) and the better model fit for the service quality → satisfaction path in their study.

Hypothesis 4

This study examined the relationship between perceived service performance and student satisfaction. The null hypothesis, $H4_o$, states that there is not a significant correlation between service performance and student satisfaction in a four-year, post-secondary institution. The results of the study in Table 4 (C.R. = 7.096; $p < 0.05$) suggest that the null hypothesis should be rejected and there is a significant correlation between service performance and student satisfaction in a four-year, post-secondary institution. This result was confirmed in the findings of Brady, Cronin, and Brand (2002) and their replication of previous studies by Cronin and Taylor (1992).

Hypothesis 5

This study investigated the relationship of salient student retention variables and student satisfaction. The null hypothesis, $H5a_o$, there is not a direct relationship between academic integration and student satisfaction, was rejected (C.R. = 4.783; $p < 0.05$). This is confirmed in the work of Bean and Bradley (1986). Since the linkage was omitted to improve model fit, the null hypothesis $H5b_o$, there is not a direct relationship between social integration and student satisfaction, fails to be rejected. This contradicts the findings of Bean and Bradley (1986). The next null hypothesis $H5c_o$, there is not a direct relationship between institutional fit and student satisfaction, was rejected based upon the results in Table 4 (C.R. = 14.157; $p < 0.05$). This confirms the results of the research of Bean and Bradley (1986). Null hypothesis $H5d_o$, there is not a direct relationship between academic finance attitude and student satisfaction, failed to be rejected due to its poor fit in the SEM path diagram. Null hypothesis $H5e_o$, there is not a direct relationship between goal commitment and student satisfaction, was accepted, because the linkage was excluded due to its impact on the SEM fit indices. Finally, the null hypothesis, $H5f_o$, there is not a direct relationship between family/peer encouragement and student satisfaction, yielded the results in Table 4 (C.R. = -1.945; $p > 0.05$) suggesting that the null hypothesis failed to be rejected. This contradicts the findings of Bean (1985).

Hypothesis 6

The sixth hypothesis looks at the relationship between student satisfaction and the student's level of institutional commitment. The null hypothesis states that there is not a positive relationship between student satisfaction and student's institutional commitment to the post-secondary institution. The structural equation model developed for this study has to be trimmed of institutional commitment for reasons of optimal goodness of fit, and, therefore, the null hypothesis fails to be rejected.

Hypothesis 7

Hypothesis 7 examined the relationship between the student's level of institutional commitment and student retention. Again, the need to trim out institutional commitment in the SEM suggests that the null hypothesis, $H7_o$, there is not a positive relationship between the student's institutional commitment and student retention, fails to be rejected. Institutional commitment plays a major role in retention for previous models (Bean & Bradley 1986; Cabrera et al. 1993), but it did not fit in the integrated model for this study.

Summary

The research findings provide some insight into the relationship between service quality, satisfaction, and student retention at four-year, baccalaureate degree granting institution. The findings also show some significant relationships between salient student retention-related constructs and the student's

level of satisfaction with his/her post-secondary institutions. It is important to note that student satisfaction has a positive impact on student retention (C.R. = 2.938; $p < 0.003$) and needs to be examined and reviewed on a consistent basis to ensure optimal enrollment management. Additionally, this analysis also shows support for previous studies that had found support for the positive relationships between service quality performance and satisfaction, and satisfaction and student retention.

DISCUSSION

Just as businesses rely on customer satisfaction to remain successful and profitable, colleges and universities must discover ways to address the needs and wants of their major customers, their students. Students as customers seek to receive the ultimate satisfaction as well as career opportunities upon graduation. Since the student is presented with many choices in the marketplace, many institutions conduct open houses and exploration days for the students to get a preliminary idea of what life within the institution is like. Once the student is recruited it is up to the institution to manage the students' expectations. Hopefully, this leads to service quality, satisfaction, a positive representation of the institution, and student retention.

MANAGERIAL IMPLICATIONS

The study's findings provide several implications for higher education administrators, staff and faculty on the use of methods to measure student satisfaction and commitment to the institution. The results are consistent to previous studies that suggest that service quality perceptions are directly related to consumer satisfaction (Cronin and Taylor 1992, 1994; Teas 1993). Therefore, it is wise for the institution to be student-centered and create an organizational climate that focuses on customer service from all college/university employees.

Administrators need to be more visible and interact with the students. By becoming a greater part of the campus learning community, most administrators can build relationships with students and emerge from their perceived 'ivory towers.' The concept of a learning community is all encompassing and requires an element of participation by all constituencies on campus. On a smaller scale, in-class group assignments contribute to the creation of the learning community. Tinto (1997) suggests that this helps to improve the student's level of academic integration as well as creating more opportunities for social integration particularly for non-resident students. This research reveals that today's students expect more from their institutions. They expect appealing campus facilities, quality/modern equipment, and prompt service. The new students are part of a generation of millennials, students that tend toward group activities, possess similar values as their parents, desire structure and experiential activities, and use the Internet for school, work and leisure activities (Oblinger 2003). Oblinger (2003) suggests that this new student is comfortable with technology to the point that they are dissatisfied with what they see as an inadequate use of technology on campus. This is reflected in the results of the study showing that the respondents' expectation for a college to have modern equipment has a mean of 6.61 while the respondents' perception for their institutions actually having modern equipment has a mean score of 4.72.

The results show that today's college student wants prompt attention, and many institutions have begun to change operational procedures to accommodate these students. The registration process at some institutions has gone online to expedite class schedules and enrollments. These students also desire to stay connected and are more prone than their predecessors to call and email their professors for information and assistance. The professor's response is expected by these students on a timely basis, making this another customer service factor that needs careful and immediate consideration due to its impact on student satisfaction and retention.

In the area of financial aid, most institutions receive average grades. The study results also show that 68.9% of the respondents receive financial aid and the mean score of their rating of the level of help

from financial aid was 4.32 on a seven-point scale. Most institutions including those surveyed expressed their concern about financial aid and focus on that office's proactive execution of its duties and responsibilities.

The results of this study show that today's students are entering colleges and universities with new and different attitudes and aptitudes as a result of social and cultural changes in the United States. These changes in student expectation levels and their subsequent satisfaction with the educational environment bring new challenges to the higher education marketplace. It is becoming crucial for the private, four-year, college or university to stay in touch with and understand the wants and needs of these new students. New paradigms need to be developed to balance the opinions of the trustees, administrators, faculty and staff with the preferences of the student body in the twenty-first century.

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Experiences of Mature Age Female Students Studying Psychology: A Phenomenological Account

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ABSTRACT

Australian Government policies have increased accessibility of under-represented groups into Universities, and one significant group in this shift is mature aged women (Department of Education, Science and Training 2004). University policy related to provision of support for nontraditional groups of students, through improved academic and support services is beneficial in improving student retention rates among non-traditional student groups (Krause et al. 2005). The present paper reports a phenomenological approach (Moustakas 1994; Smith & Osborn 2003) to understanding how expectations of higher education impacts on adjustment to study within lived experiences of 12 women aged between 40-49 years studying Psychology. Each participant took part in a semi-structured interview with topics such as reasons for commencing study, factors in forming their expectations of academic and social support and how lived experiences differed from these expectations. Findings suggest the design of student services and transitions programmes must adjust to students' narrative life story (McAdams 2001) consider how their life stage interacts with expectations, motivations, and present and future goals.

Keywords: Attrition, mature age students, transition to university.

INTRODUCTION

Recent Australian Federal Government policies have resulted in increased accessibility, and encouraged participation by under represented groups, into Australian universities (Krause et al. 2005). The student population has become increasingly diverse (Pascarella & Terrenzini 1998) and the view of the student as being full time and straight from high school, has been superseded by a student population consisting of more mature students with diverse entry pathways into university (McInnis 2001).

Increasing diversity has not come without problems and one area of concern has been low completion rates of degrees by groups of non-traditional students (Taniguchi & Kaufman 2005). One student group, within the new diversity, are mature age females between the ages of 40 to 49, who have become an increasingly significant proportion of the student population. In 2002, 4,975 mature age female students between the ages of 40 to 49 were enrolled in Australian Universities. This group have been severely affected by attrition and during their first academic year, approximately 27% withdrew from their course (Lukic et al. 2004).

It is important to address attrition for mature age students, not only because students may suffer significant stress and anxiety in their lives when wrestling with the decision to withdraw from university; but also because Australian universities are funded on numbers of students who complete their study (Darlaston-Jones et al. 2003). In order to reduce attrition rates and improve university

learning for these students, it is important to learn more about their experiences and how they have overcome problems that might lead to withdrawal. This knowledge is applicable to the design of student support and counselling services and may reduce attrition rates and further increase accessibility to university (Darlaston-Jones et al. 2003; McInnis 2001).

Transition, Expectations and Adjustment to University

The adjustment or transition period, if achieved, often involves an assessment of whether the reality of university matches with expectations. If this period is successfully negotiated and expectations and reality are reconciled, then the student has more likelihood of committing to university study and successfully completing their course (Ramsay et al. 1999).

In an examination of the transition experience of Australian students to university, Urquhart and Pooley (2007) conducted a study with first year university students (n=12) studying psychology at Edith Cowan University. The participants in the study ranged from 17 to 45 years, were interviewed and asked to describe their experience of starting university; the academic and social adjustments they had had to make; their expectations of university and to describe any positive or negative experiences or emotions they had undergone. Emerging from the qualitative interviews were five themes: social support, expectation, time management, transition issues, and emotion. Although the themes identified were important to all student groups, the study indicated that there was a difference in how these themes were experienced between school leaver and mature age students.

As Urquhart and Pooley (2007) found, all student cohorts recognise the need for social, emotional, and practical information support to help them through their university career, thus it is important that universities understand the needs of diverse student groups, together with their motivations for attending university in order to plan their transition and assistance programmes accordingly (McInnis 2001). If these external expectations related to social, academic, informational, and transitional support are not met by the university, it is then that the student may be at risk of withdrawing from study.

In order to manage the gap between students' expectations of university and the reality of their experience it is important to learn more about their expectations of university. Expectations are not only related to academic and social support services provided to the student by the university, they also include internal expectations formed by the student of their own ability to cope with the academic and social pressures that study will entail. Internal expectations and how they influence adjustment and transition into university for mature age female students are now addressed.

Internal Expectations and Adjustment into University

Central to the decision to embark on academic study are a student's internal expectations of ability to cope with academic challenges, to manage roles and responsibilities both at university and at home or work, together with expectations for career development and changes to identity (James 2001; Michie et al. 2001). Students have expectations of their ability to cope with the challenges of academic study which may or may not be realistic and this may affect their integration into university.

Murphy and Roopchand (2003) focused on the complexity of mature age women's completion of university courses in a study of their intrinsic motivation and self esteem. In this study, participants from a university in the north east of England (n=160) were involved in an independent groups design using two questionnaires, measuring their motivation and self esteem. The results showed that mature age students had higher levels of self esteem and motivation towards learning. Murphy and Roopchand related mature students' higher self esteem to being older, having clearer motivations and making more informed decisions, and due to their high levels of self esteem and motivation they tended to do well in the university setting, they gained in self confidence as they gathered more positive feedback.

In their conclusion to this study the authors acknowledged that although mature age students developed higher self esteem and confidence, there was confounding evidence as many mature age students saw themselves as being more anxious and less confident when they compared themselves with traditional students (King 1998 as cited in Murphy & Roopchand 2003). They suggested that entering university formed a transition in mature students' lives and if these students achieved good academic results during their initial period of study, they gained positive feedback, grew in self confidence and self esteem and became increasingly motivated to study. These participants were established at university and therefore we might expect that the mature students surveyed had successfully negotiated a transition stage and had developed self confidence, there is no account made of mature age students who may not have received positive feedback and had therefore withdrawn from study in the early stages of their course. We must question how mature age students cope with university if they find study difficult, whether support and transition programmes can be put into place and how self esteem affects the experience of mature age female students.

In an investigation of the adjustment behaviours of mature aged women returning to formal study via a university enabling programme, Cantwell and Mulhearn (1997) analysed the experiences of 10 mature age women undertaking part-time study at the University of Newcastle, Open Foundation Course. The women completed questionnaires on approaches to learning and on attributional beliefs and then took part in two focus groups, one at the beginning of the semester and one at the end. The women reported developing maladaptive learning processes moving away from deep processing to surface learning approaches mainly due to difficulties in time management as they negotiated their competing roles.

However, Cantwell and Mulhearn (1997) found evidence that this change enabled them to carry on with their courses and retain their motivation for self-improvement. For most women surveyed, motivation to study was about identity regeneration and the researchers suggest that some women entered university with the expectation that study would aid their self growth and their identity development, but otherwise had little knowledge of the processes of university learning and the impact that study would have on their life outside of university. Hence, their expectations of what university would offer, in terms of self development, were realistic but their expectations of how they would manage and cope were unrealistic. This finding is strongly related to attrition because if the gap between expectations and ability to cope was large, the mature age student would not have planned for resources to enable them to negotiate through university and hence may be forced to consider withdrawing.

Research on expectations, focussing on mixed age group students, general cohorts of mature age students and mature age women, show a complex relationship between expectations, motivation for study, perceived self efficacy and roles other than that of a student. In order to understand this dynamic more fully in relation to mature age female students the characteristics of this group need to be considered in more depth.

The Characteristics of Mature Age Female Students

Cantwell et al. (2001) conducted a study of students entering the University of Newcastle (n=8503) via differing entry methods. Data was collected on their age, achievement level, gender, entry qualifications, and discipline of study. Results showed that older students outperformed younger students. However, mature students entering university via non-traditional entry programmes, tended to favour part-time, rather than full-time study and those who withdrew from university prior to degree completion, had higher achievement levels than other students in this category. This study indicated that higher attrition rates amongst mature age students were related to factors external to university such as the role demands placed on them by family responsibilities, the need to combine study with paid employment and financial pressures.

The impact of role demands on mature age female students has been shown to be a complex issue. Scott et al. (1998) surveyed motivation amongst Australian mature age female students with children (n=235). Two groups of participants were identified, one of current students and the other mature age women who had interrupted their study. Both groups completed a questionnaire designed to gain information about women continuing in education. The results showed little difference in motivation between mature age women with children who graduated and those who did not. However when personal circumstances were controlled for, the researchers found personal history and life circumstances underpinned the reasons for return to study and contributed to the decision to leave study. For some women, return to study was a mechanism to escape from low self esteem, disappointment with marriage or life in general and unsupportive families. Such women reported high levels of motivation for study in an effort to discover new roles for themselves but may have underestimated their ability to cope with study and difficult personal circumstances. Other students reported development of new identity beyond that of 'wife' or 'mother' was their major motivator to return to study. When they achieved this from their study experiences, they found university fulfilling. For others social support from other students and academic staff at university enabled them to cope effectively with the demands of university (Scott, Burns, & Cooney 1998).

Due to the complexity of issues which affect mature age female students (Scott et al. 1998; Wilson 1997; Quimby & O'Brien 2006; Taniguchi & Kaufman 2005), it is important to gain further understanding of the factors which influence the experience of mature age female students. Their experience involves a complex interplay of psychological states including life stage, motivations for return to study, expectations and self efficacy. While research implicates psychological life stage as an important factor, explicit arguments about the role of such psychological theory are not being made. Therefore we now turn to a discussion of life stage in order to identify whether this concept has utility in the understanding the issues which affect mature age female students.

Does Life Stage Explain Mature Age Women's Reasons for Return to Study?

Adult educators often subscribe to the view that the decision to participate in adult learning is related to developmental changes which take place throughout the lifespan (Tennant 2006). A life span developmental model was defined by Erikson (1968) who proposed that people progress through eight developmental stages. Within each stage individuals must experience a psychosocial transition crisis which must be resolved prior to successful development and successful advancement to the next stage.

Erikson maintained that middle aged people start to be concerned with producing something that can be left for future generations (Ackerman et al. 2000) and that their psychosocial development involved a resolution of the conflict between generativity and stagnation. According to Erikson (1968) generativity became most salient around the age of forty and revolved around establishing and guiding the next generation and contributing to the future (Ackerman et al. 2000). A major characteristic of this stage was that the individual became concerned with the future of society as a whole and fostering development of others as well as making a valid contribution to society (Peterson & Stewart 1993).

According to Erikson (1968) the ability to become a generative adult is dependent upon successful resolution of earlier developmental stages, most significantly the development of identity (Vandewater et al. 1997). Research indicates that few people establish identity achievement by the end of adolescence (Waterman 1982) and this may be particularly so for women who traditionally have based their identities on children and partners (Vandewater et al. 1997). Vandewater, Ostrove, and Stewart (1997) proposed that there was a relationship between the development of identity and well being for mid-life women and that generativity could not be attained until successful resolution of earlier personality development. Hence the resolution of the generativity stage involved women in an assessment of their identity status, whether they have a traditional role regret relating to career choice over home, an analysis of their roles and a re-evaluation of how they could contribute to future generations (Stewart & Vandewater 1999; Vandewater et al. 1997). Levinson (1986) also proposed a life stage theory of adult development in which he identified a mid life transition stage to take place

between the ages of 40 and 45. He suggested transitional phases which served to terminate existing life structures and allowed the creation of new ones enabling the person to move forward and explore new possibilities for life.

However, the rigidity of boundaries for developmental stages has been refuted by McAdams (2001) who proposed that identity takes the form of a personal story and that identity construction is an ongoing process which takes place throughout the lifespan. Reconstructions of the past, perceptions of the present and goals for the future are integrated by the individual to form a narrative life story. The life story takes into account cultural values and norms and is constantly updated and re-evaluated as the cultural and social context changes. McAdams agreed that generativity was an important issue in the life story during middle years and this translated into revision of one's life story and consequent adjustment to formulated plans (McAdams et al. 1993).

In a review of literature relating to the psychosocial development of women, Caffarella and Olson (1993) suggested that Erikson and Levinson's theories were too prescriptive for many women and that these theories had largely been developed from the perspective and life course of men. They proposed that developmental theories relating to women must be based on women's experiences, and their individual differences must be taken into account. They suggested that issues that have more prominence in women's lives must be incorporated into theories of development; Sales (as cited in Caffarella & Olson 1993) related that women adapt to their changing roles related to children being born, developing, leaving home and having their own children. Targ (as cited in Caffarella & Olson 1993) also suggested that unanticipated events in women's lives had major significance in identity generation, such as divorce and widowhood and that factors such as these needed to be understood in developmental theories relating to women. Caffarella and Olson concluded by recommending that any attempt to understand the psychosocial development of women must be tempered with knowledge of the diverse patterns of development, the importance of identity and intimacy and the centrality of relationships to women.

Although life stage theories might be too prescriptive for many women, life course and life story may play a part in a woman's decision to return to study and these models should be considered in the complex interaction between life stage, expectation development, and experiences in a woman's journey through university.

The object of this study is to explore mature age women students' aged 40 to 49 years, reasons for commencing study, the formation of their expectations and to describe their experiences at university in order to discover whether their expectations were met. The purpose of the study is to explore the differences between expectations and experiences of university and discover how mature age female students address this gap.

Research Purpose

This study aimed to explore the experiences of mature aged female students between the ages of 40 to 49, who were studying psychology, in the context of potential differences between expectations and experiences of university, and to discover how they address any gap.

Research Methodology

A phenomenological research methodology, described by Schwandt (2001) as an exploration of a person's 'lifeworld', is suggested. Phenomenological research analyses lived experiences and attempts to make sense of them, and to describe and understand them (Polkinghorne 2005). Holstein and Gubrium (1994) suggested that one of the basic tenets of phenomenological research involved interpretation of the particulars of lived experiences in order to render meaning to the experience. This involved collection of data from people who had experience of the subject being investigated, and from what they communicate to the researcher, to develop a description of the 'essence' of the

experience (Moustakas 1994: Racher & Robinson 2002). The essence comprises forming deep understanding of lived experiences (le Vasseur 2003). Essentially to unpack the complexity of motivation, life stage, expectations and roles, it is necessary to know about what the lived experience of mature aged women students holds.

Design

The rationale for this design choice was driven by Polkinghorne (2005), who advocated data collection methods which had vertical depth, that is, allowed for explanation, understanding and reflection and would enable participants to explore meaning of their experiences and relevance of interrelationships. He suggested that quantitative methods were inappropriate for collecting information about experiences because techniques such as short answer questions and Likert scales were only suitable for gathering surface information. Qualitative phenomenological based interviews would allow researchers to redirect or rephrase questions enabling collection of information which would be multilayered and complex in nature reflecting the true nature of issues under examination.

The research, therefore, followed a phenomenological approach as defined by Moustakas (1994) and formed an in depth qualitative study describing the lived experiences of women aged between 40 and 49 years, why they decided to study at university, what their expectations were and whether experiences matched expectations.

Participants

The experiences of the first author as a mature age woman studying at university have provided a focus for the study, and through bracketing of these experiences researcher interpretative biases are made explicit (Cresswell 1998). This bracketing included observations that mature age women may decide to study psychology because they feel it addresses a need to contribute to society (Erikson 1968). Their expectations of study may not take account of their conflicting life roles and for some women significant stress may occur in the resolution of the conflict between expectations and reality (Scott et al. 1998; Quimby & O'Brien 2006). Mature age females studying psychology provide an example of a unified but diverse student group and create a framework for analysis of reasons to attend university, development of expectations and the relationship between experiences and expectations.

The participants were 10 female students, aged between 40 and 49 years, studying psychology at Edith Cowan University. The participants were purposefully selected via advertisements on noticeboards in the School of Psychology and Social Science. Information and informed consent letters were distributed to participants.

Materials

Five open-ended questions were used in a semi-structured interview to gain information about the social and cultural contexts affecting the mature age women students. The questions were: what were the factors determining your decision to come to university; what were your expectations of university; when you started at university how did your experiences differ from your expectations; what did you do when your expectations did not match up to your experiences at university and what could the university have provided which would have helped you to make the adjustment to university? The questions were followed by prompts such as "Can you give me more information about." (Rice & Ezzy 1999). A portable recorder was used to record the interview.

Procedure

The interviews took place at a mutually convenient location agreed between the researcher and participant. Each interview took between 1 hour and 1 hour 30 minutes approximately. The interview was digitally recorded and reviewed and selected segments were transcribed verbatim.

Analysis

Prior to analysis the researcher acknowledged her own biases and prejudgements in order to make an unbiased analysis of the data (Cresswell 1998). All possible meanings and perspectives were sought to create frames of reference and describe how the phenomena were experienced by the participants in the study (Smith & Osborn 2003). The researcher reviewed the tapes several times to become familiar with the data. Verbatim transcripts of noteworthy segments were made. Significant statements relevant to expectations, discrepancies between expectations and reality and information related to reasons for attending university were identified. Significant statements were grouped into units of meaning, and then described. Clusters of meaning were defined through cross-case analysis and common themes and issues grouped together (Cresswell 1998).

To ensure rigour in the analysis records of the classification and categorisation of the data were kept and a full audit trail of notes, coding and any revision of documents was kept (Mays & Pope 1995). Researcher bias was acknowledged and notes kept in the audit trail or researcher's notes were assessed by the project supervisor to ensure that any bias by the researcher was acknowledged in the reporting (Mays & Pope 1995).

FINDINGS AND INTERPRETATIONS

From the analysis three major themes emerged, these were reasons for attending university, preparation and support. Throughout all the themes identified, the relationship between expectations and reality of the university experience played an important part in understanding the experience of the mature age female student.

Life Stage/Identity and Reasons for Attending University

One of the major themes that emerged from the data was that the mature age women started university because they felt they were at a time in their lives when they were looking for new direction, and because of their life circumstances, and the ages of their children, they were able to engage in fresh opportunities. An example of how life stage influenced the decision to attend university was described by one participant:

> *'I was at a stage with my children. They were older … I had never gone back to work after I had them and one was already at high school, one was coming up to high school and one was probably about year 5 and I was beginning to think I don't need to be at home anymore. They couldn't have cared less that I was home or not.'*

Another participant describes the generative motivation to return to study as:

> *'I just needed to do something for myself and I suppose show that I was much more than just being a mother and a wife'.*

This finding relates to Erikson's (1968) theory that a person could only become a generative adult following the successful development of identity. Vandewater et al. (1997) suggested that it might only be possible for women to attain generativity if they developed their identity away from that which was based on their children and partners. The data showed that the women seemed to be involved in an assessment of their identity status and a resolution of any role regrets that they might have had by choosing home and family over career choice. One woman described her conflict in deciding to return to study as:

> *'I had had to go through a lot of processes internally myself in terms of sorting my situation out, where I was at and I think my Mother's illness helped in a way because I knew that I didn't want to finish up\having regrets.'*

The data shows evidence that women's reasons for returning to study may take the form of a personal story which is constantly being updated and re-evaluated dependant upon the context of their lives. This theme supports the theories of life story proposed by McAdams et al. (1993). For example below, one participant reported identity as if it was an ongoing narrative that was evolving throughout her lifespan:

> *'when I did my first degree I always wanted to do social work or something with people and helping people because that was where I thought I could contribute but due to circumstances I didn't do it as a seventeen year old; so I think I always had this yearning for wanting to give it a go'.*

These findings illustrate that the women were involved in a process of reconstructing their past experiences and integrating these with their perceptions of what is currently happening to them and analysing their future goals in an effort to develop an integrated life story. The findings show that for mature age women, the decision to return to study was strongly linked to their identity and particularly to defining their identity away from the home and family. This woman had strongly identified her interest in caring for people but the opportunity to work in this area had been subsumed by other demands, but had remained part of her life story and it is only in her middle years that the woman had an opportunity to revise and consequently adjust her plans.

Preparation

Another major theme identified in an analysis of the data was that many of the participants undertook very little preparation in finding out about the content of the course that they would be undertaking. Most were unprepared for statistics to be part of their course and others reported that they had little idea of what they were about to study. This was illustrated by one of the participants who said:

> *'it's different to what I expected. I thought they were going to teach us how to help fix someone's problems, to be able to sit across the desk from someone and ask what their problems were and for them to teach us how to give them strategies to fix what they can't cope with.'*

A recurring theme was of 'needing more in life'. For some women this was related to how they adapted to change in their children growing up (Sales, as cited in Caffarella & Olson 1993), for others it was stepping away from being a wife or mother (Vandewater et al. 1997) and these changes were realised as an opportunity to return to study. Focused in this motivation, it seems women had not thought through their transition to University and a common theme reported by several participants was that they enrolled without investigating fully what they would be undertaking. Their expectations were not based on detailed preparation or research, but on making a general change in life and as one woman said:

'I didn't really go into it with my eyes fully open about what it was really going to be like … maybe I underestimated the degree of difficulty and the way .. the demand on your thought processes, to analyse and to critically think about things and there were some concepts that were very difficult. The statistics – that was something that totally came out of left field … that was not something I was expecting to be part of a psychology degree. I was thinking psychology would be about depression and anxiety and mental illness – how to diagnose and recognise symptoms and counselling.'

This finding supports work by Cantwell and Mulhearn (1997) who found that some women entered university with the expectation that university study would aid their self growth and their identity development, but otherwise had little knowledge of the processes of university learning.

This finding might also be relevant to their choice of studying psychology. It would appear from the data that the mature age women interviewed had developed an interest in psychology because they had some specific connection with psychology, and through this connection they formed a link between their study plans and their life history. One participant related that she had developed an interest in psychology through her sister's experiences with a psychologist:

'she had seen a lot of psychs over the years and it just always interested me … strategies they used to give her to cope with what she was going through.'

Although the women generally expressed that they had an interest in psychology, and the continuation of this interest was linked with their identity development through their decision to study, beyond that general point very few of the participants showed that they had a depth of understanding of what studying psychology entailed.

Support

Academic Support

Maybe because of the general lack of specific expectation above, students in this study generally considered themselves to be exceptionally well supported academically and well beyond their expectations, as exemplified by one student who said:

'When I came into the programme here I was just amazed about how professionally it was run, the amount of communication that was happening, the support that the students got in terms of resources and also the fact that your feedback came very quickly and timetables were there you could just log on and get your timetables.'

The effect of the academic support enabled the students to develop academic self confidence and this concurs with a study undertaken by Murphy and Roopchand (2003) who suggested that if mature students new to university achieved good academic results and gained positive feedback, they grew in self confidence and self esteem and became increasingly motivated to study. This was a strong theme in the findings with several students mentioning that they achieved higher grades than they expected and they had found their success motivating. One student in the study summed this up by saying:

'when I got my first result back and I had done quite well then I thought … I can do this and I am good at it.'

Social Support

Interestingly, the major theme that developed relating to social support was that the majority of mature age female students had very little expectation for social support at university. They reported that they were not looking for it and generally did not expect that they would make friends or engage in social

interaction. Their expectation tended to focus on attending university, getting the work done and not being distracted by social contact. A theme that developed was that they expected there to be very few other mature age students and that they would be socially isolated, one participant said:

> *'I expected that I was going to be old and I was going to be in a class of kids who hadn't long been out of school and I wasn't sure that I would fit in'*

This finding indicated that they underestimated the value of social support networks prior to commencing university but as they progressed through their courses most participants reported that they used social networks to exchange information on assignments and find out information about tutorials and lecture schedules. In reflection, one participant who had mentioned that she had not expected to gain social support at university stated that her adjustment to university would have been easier if there had been more 'connection':

> *'more in terms of friendship and connection…I expected the bigger social thing happening and I think this didn't happen because there was nowhere to go and if there had been then people would have got to know each other. In first and second year it was just come in do your class and go home.'*

Family Support

Perhaps one of the strongest themes common to all participants was problems associated with their roles outside of university. Scott et al. 1998 reported on the complexity of the interaction that women face when juggling the demands of family, work and study and a major theme identified by the current study was the importance of family support. Most of the women planned their study around the needs of the family, in the majority of cases this involved them in part-time study; most of the women were willing to take longer to complete their degree and felt the need to reduce the impact that their studying had on the family. As one participant stated:

> *'my husband encouraged me initially ... but because I have always been at home he has worked full-time he hasn't had to think "what are we going to have for dinner"... he was finding it a bit hard to cope so I just slowed it back down again and just went back to the two units. It took longer to finish the degree than I would have liked but obviously I had to consider everyone else.'*

The overwhelming theme was that university study had become so important to them that they were willing to juggle and manipulate their lives in other areas in order to continue their degrees but they could only do so if they felt that they were looking after the needs of their families. Although some women reported that they were financially supported by their partners, and that their families were supportive, the majority of the women felt that they had responsibility for nurturing their families and they felt that it was their role to rearrange their study to ensure that the family was not inconvenienced.

A common thread was that although the women placed very high priority on their studies they felt that the level of importance was not understood by their families. One woman said:

> *'I would say that he is not crazy about me studying at all ... And the kids ... I know they wouldn't care if I studied either and they are lots of work, you know teenagers, helping them with their homework ... So I can't say anybody is encouraging me to do this other than myself.'*

The overriding theme related to family support was that although some partners and families expressed support and some tried to provide practical help, most of the women felt that they had '*consider everyone else'* and there was an implication, for some, that studying was something of an indulgence and could only be undertaken when their families needs had been met. This finding

highlights the complexity of role demands and concurs with the findings of Scott et al. (1998) who found that women's roles outside of university can have both a positive and negative influence.

Induction Support

One of the major themes to emerge regarding transition to university revolved around lack of personal interaction with the university or more specifically with the psychology department. Most of the women reported that the decision to return to study had been a difficult and complex one, for some it had involved several years of research and anticipation. The application process was fairly straightforward but it represented the prospect of major change in these women's lives. One woman stated:

> *'I just remember getting a letter saying right you are accepted … that was it, there was no more contact, nothing personal, no names and contacts of people to give you help and advice.'*

As Urquhart and Pooley (2007) found, most student cohorts recognise the need for social, emotional, and practical information support to help them through their university career. The same is true for the women in this study who often reported their first interaction with the university to be distant and unwelcoming. In particular women reported a need for more personal recognition and acknowledgement at the start of their course; this is exemplified by one woman who said:

> *'this was a major thing for me …but they didn't even have my name on a list … I think they could have done a lot more for some of the mature age students*.'

CONCLUSION AND RECOMMENDATIONS

This study found that there were three main themes which mature age female students identified as important in their experiences of university. These themes were life stage and its relationship with reasons behind the decision to return to study, preparation for study and support issues. Central to all of these themes is the importance of expectations and the differences between expectations and the reality of the lived experience. These women talked about their experiences from the point of view of having overcome difficulties and it might be possible to use their information when considering planning resources for new groups of students. These women have overcome difficulties and for other students, these problems may have become the factors which have influenced their attrition.

The major recommendations from this study involve:

- Careers counselling and course marketing material might be designed to give more specific information related to course content in order to help women make the correct choices when they recognise that they have a life opportunity to develop their identity away from home and children. An interview with a careers counsellor to help complete applications to university may help potential students choose the most suitable course for them.
- Practical support such as planning programmes that can be flexible to meet the needs of women as they juggle with their other roles and support they give to their families. This may involve flexible timetabling and delivery options
- Universities might investigate providing a contact person from the academic staff to perform a pastoral tutor role. This would serve the dual function of providing personal acknowledgement to the mature age students that they have joined the university environment and hence they are welcomed and feel part of the university community and it would give the students a contact point if they need to adjust their study load to facilitate their family commitments. Although peer mentoring does try to fulfil this function it does not cover the enrolment process and does not help students during their first few days at university. Students would then have a point of contact and this may make them feel accepted into the university environment.

- Connecting networks or cohorts of mature aged women such that women know who else is within their cohort and can share their experiences, this would enable social support networks to be developed and enable a forum for discussion that helps women normalise their experiences. This could be done by social functions or through e-mail links organised via mentoring support.

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Ranking Competencies for Software Developers in Thailand

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ABSTRACT

The purpose of this study was to prioritize/rank 12 existing software developer competencies and to find the pattern correlation among these competencies. A survey was designed to elicit responses from a target group (N=350) of software developers, system analysts, lecturers in Information and Communication Technology (ICT), ICT managers and others related to software industry (e.g. information technologist, software architect, computer technicians) in 14 organizations in Thailand. The return rate was 80.57% or 282 out of 350. Data was analyzed using descriptive statistics. Factor analysis was used to identify correlations among the 12 competencies. The 12 competencies were previously identified in a study of competencies for software developers in Thailand. The ranking was as follows: expertise; teamwork; logical thinking; system thinking; relation and communication; creative thinking; achievement; future thinking; emotion and ethic; flexibility; service mind; leadership and influence. In terms of correlations Future Thinking; System Thinking Relation & Communication; Teamwork are correlated. The second set of correlated factors are as follows: Leadership & Influence; Expertise; Emotion & Ethic; Flexibility. This research was limited to an investigation of competencies for software developers in Thailand only.

Keywords: Competencies / Software industry / Software Developer / Thailand / Factor Analysis

INTRODUCTION

Software developers are important keys to success of the software industry. In fact, as Turley and Bieman (1995) argue "Much effort has been placed in the development of engineering approaches to software development such as software tools, coding practices, and test technology. But the over-whelming determiner of software productivity and quality is still personnel and team capability" (p.19). Turley and Bieman further argue that software developers possess unique skills or competencies to solve problems related to software engineering. Boyatzis (1982, p.21) defined competency as "an underlying characteristic of a person which results in superior and/or effective performance in a job." The study of competencies can improve job descriptions, employee selection, staff development, performance evaluation and promotion (Lucia & Lepsinger, 1999; Spencer & Spencer, 1993).

A study by Booneka and Kiattikomol (2008) formulated a model of competencies for software developers specifically for the unique cultural, social and economic context of Thailand. The model identifies 12 competencies as follows: Expertise; Teamwork; Relationship and Communication; Service mind; Achievement; Flexibility; Leadership and influence; Emotion and ethic; Logical thinking; System thinking; Future thinking and Creative thinking. **Expertise** involves knowledge,

skill, knowledge application, continuous learning, follow-up technology trends, standards for software development, transfer knowledge, understanding of client's requirements, understanding of the business process, and prioritizing of tasks. **Teamwork** involves individual work as well as team work; cooperation, collaboration, coordination with each other, follow-up policy-making and acceptance of other's idea. **Relationship and communication** involve communication with others: communication in teams, good relationships, and respect for older people. **Service mind** involves appreciation and understanding of client's/user's needs. **Achievement** involves motivation, enthusiasm, diligence, patience, circumspection, responsibility and time management. **Flexibility** involves compromise and flexibility. **Leadership and influence** involve leadership, influence of others, and control of situations. **Emotion and ethic** involves emotional intelligence, sympathy, empathy, kindness, playfulness, calmness, consideration, willingness to help and honesty. **Logical thinking** involves an ability to design algorithms. **System thinking** involves being able to design for the whole system. **Future thinking** involves planning for the future. **Creative thinking** involves an ability to solve problems in different ways.

Booneka and Kiattikomol's (2008) study did not rank or prioritize these 12 competencies. Nor did their study identify any correlations among the 12 competencies. The purpose of the study reported on in this paper therefore was 1) to prioritize/rank competencies and 2) to identify the correlation among competencies in their model. Result of this study will be useful to Thai students and software developers to prepare and develop themselves to meet the requirements of companies and organizations. The results can also be used for companies and organizations for purposes of recruitment, placement, retention and promotion. Finally, the results will be of use to institutions to develop curriculum to train students.

METHODOLOGY

Participants

The target group consisted of 350 software developers, system analysts, lecturers in ICT, ICT managers and the others (related to software industry) who work in 4 public (government) and 10 private organizations (software houses, financial company, ICT service company) in Bangkok, Thailand.

We first contacted by telephone the heads of the organizations to tell them about the study and to informally invite their participation. The heads then identified individuals within each organization to help with recruitment. These individuals were contacted by telephone or in person. They chose the people. Potential respondents were offered a small gift for participating. Next, letters of cooperation from the coordinating institution of the researchers (King Mongkut's University of Technology Thonburi, Faculty of Industrial Education and Technology) were sent to the organizations to outline the purpose of the study and to request their participation.

Instruments

Included with the letter was a survey. The survey was designed by the authors of this paper specifically for the study. It consisted of one page and two parts. The first part focused on demographic information such as gender, age, position and years of experience. The second part listed the 12 competencies and invited respondents to rank all competencies from lowest to highest with the number 12 being the highest. The survey listed the competencies in this order: expertise; teamwork; relation and communication; service mind; achievement; flexibility; leadership and influence; emotion and ethic; logical thinking; system thinking; future thinking; creative thinking. The survey included a brief (one or two lines) description of each competency. We estimated the completion time for each survey at 10-15 minutes approximately.

We present a section of the survey here. The survey was presented to participants in Thai language with, in addition, labels in English for each competency.
Instruction: here is the list of Competencies for Software developers in Thailand; Please rank the competency from highest to lowest (12=highest, 1=lowest)

Competency	***Rank***
Expertise; Expertise involves knowledge, skill, knowledge application, continuous learning, follow-up technology trends, standards for software development, transfer knowledge, understanding of client's requirements, understanding of the business process, and prioritize of tasks	
Teamwork; Teamwork involves individual work as well as team work; cooperation, collaboration, coordination with each other, follow-up policy-making and acceptation of other's idea.	
Relation and communication; Relation and communication involve communication with others: communication in teams, good relationships, and respect for older people.	
Service mind; Service mind involves appreciation and understanding of client's/user's needs.	
Achievement; Achievement involves motivation, enthusiasm, diligence, patience, circumspection, responsibility and time management.	
Flexibility; Flexibility involves compromise and flexibility	
Leadership and influence; Leadership and influence involve leadership, influence of others, and control of situations.	
Emotion and ethic; Emotion and ethic involves emotional intelligence, sympathy, empathy, kindness, playfulness, calmness, consideration, willingness to help and honesty.	
Logical thinking; Logical thinking involves an ability to design algorithms.	
System thinking; System thinking involves being able to design for the whole system.	
Future thinking; Future thinking involves planning for the future.	
Creative thinking; Creative thinking involves an ability to solve problems in different ways.	

Response rate and analysis

The response rate was 80.57%. Two hundred and eighty two individuals returned the questionnaire among the 350 potential respondents. We analysed demographic data by descriptive statistics (sum, mean, and standard deviation). To determine the rankings, we totalled the numbers from 1-12 assigned by all 282 participants for each competency. We also calculated the mean and standard deviation for each competency. We then used factor analysis to identify the correlations among the 12 competencies.

FINDINGS

Table 1 provides a summary of the demographic or respondent profile, classified by gender, age, position and year of experience. Table 2 provides descriptive data of 12 competencies as ranked by respondents. Finally Table 3 provides factor analysis.

Table 1: Demographic information

Characteristic	***Item***	***Frequency***	***Percent***
Gender	Male	130	46.1
	Female	152	53.9
Age (years)	20-24	47	16.6
	25-29	87	30.8
	30-34	71	25.1

Characteristic	*Item*	*Frequency*	*Percent*
	35-39	37	13.1
	40-44	20	7
	45-49	10	3.5
	> 49	10	3.5
Position	Software Developer	72	25.5
	System Analyst	42	14.9
	Lecturer in ICT	14	5
	ICT Manager	14	5
	Other (related to ICT)	140	49.6
Year of experience	1-3	96	34
	4-6	58	20.6
	7-9	37	13.1
	10-12	36	12.8
	13-15	20	7.1
	> 15	35	12.4

Table 2: Descriptive data of 12 competencies as ranked by respondents

Competencies	*Total*	*Mean*	*Std. Deviation*
Expertise	2,637	9.35	3.215
Teamwork	2,347	8.32	2.979
Logical Thinking	2,247	7.97	2.923
System Thinking	2,131	7.56	2.977
Relation and Communication	2,052	7.28	2.909
Creative Thinking	1,897	6.73	3.217
Achievement	1,855	6.58	2.900
Future Thinking	1,588	5.63	3.139
Emotion and Ethic	1,472	5.22	3.173
Flexibility	1,460	5.18	2.542
Service Mind	1,373	4.87	3.437
Leadership and Influence	941	3.34	3.019

Table 3: Factor Matrix – After Rotation

Variables	*Factors*	
	F1: Teamwork thinking	*F2: Leadership professional*
Future Thinking	.823	
System Thinking	.800	
Relation and Communication	.766	
Teamwork	.679	
Leadership and Influence		.731
Expertise		.688
Emotion & Ethic		.575
Flexibility		.463

We used factor analysis (principal components analysis varimax with Kaiser Normalization, rotation converged in 3 iterations) to determine the correlation among the 12 competencies. Factor loading of 12 items of the scale produced two factors. We labelled Factor 1 as "Teamwork Thinking". We labelled Factor 2 as "Leadership Professional" as shown in Table 3.

DISCUSSION

The results indicate that software developers' competencies should be professional worker, who has experience, can work in team, show logical and systematic thinking and be able to communicate and create relations within a team and with other people. This ranking reflects the perceptions of those working in the software development industry in Thailand. Spencer and Spencer (1993) conducted a similar study in which they ranked competencies of software developers, engineers, applied research scientists, and technicians in a bank department in 24 countries. A comparison of ranked competencies between our results and Spencer and Spencer's is as follows

Table 4: Comparison between Spencer and Spencer (1993) and the present rankings (1=highest)

Spencer & Spencer		**Our Study**	
Competency	*Rank*	*Rank*	*Competency*
Achievement Orientation	1	7	Achievement
Impact and Influence	*2*	*12*	*Leadership and Influence*
Conceptual Thinking	*3*	*3*	*Logical Thinking*
Analytical Thinking	*4*	*4*	*System Thinking*
Initiative	5	8	Future Thinking
Self-Confident	6	6	Creative Thinking
Interpersonal Understanding	7	5	Relation and Communication
Concern for Order	8	11	Service Mind
Information-Seeking	9	10	Flexibility
Teamwork and Cooperation	*10*	*2*	*Teamwork*
Expertise	*11*	*1*	*Expertise*
Customer Service Orientation	12	9	Emotion and Ethic

Spencer and Spencer's study was similar to ours in that we were both working with a similar set of 12 competencies. In terms of similarities between the results of their study and ours, we note for example that they ranked Conceptual Thinking (3) Analytical Thinking (4) similarly to ours Logical Thinking (3) and System Thinking (4). These types of thinking are not exactly the same however; it is interesting to note that in both studies, these thinking skills were ranked at the same level. This would appear to indicate that Thai software developers hold similar beliefs about the competencies related to thinking as do their counterparts in other countries. It should not be surprising that thinking skills would rank so high (at a level of 3 or 4) in this profession which involves working with algorithms and abstractions.

The similarities however are limited to those competencies. In fact, we observed more differences than similarities between their results and ours. We observed for example, that whereas our respondents ranked expertise at the top (# 1), in Spencer and Spencer's study, it was ranked almost at the bottom (# 11). Likewise, Teamwork and Cooperation ranked at the bottom (# 10) for Spencer and Spencer, yet it was ranked at the top (# 2) in our study. We note as a limitation in our study that expertise and teamwork were listed as items 1 and 2 respectively in the survey. It is possible, therefore, that our respondents were influenced by the position of the items in the survey. However, we also observe that items listed at the top in the survey were also ranked at the bottom in the respondents ranking. For example, Creative thinking was item 12 on our survey yet ranked as number 6 by respondents.

The difference between the importance of teamwork for Spencer and Spencer's respondents versus ours could possibly be due to the fact that teamwork may be considered a more important competency in general in all fields in 2008 whereas, in 1993, when Spencer and Spencer conducted their study,

teamwork may not have been as important. The fact that competencies may change over time and that they are subject to larger social, cultural or economic trends is to be expected. However, we do not know why teamwork ranked so differently in the two studies. We do not for example know if teamwork might be more important in the Thai culture. Cooley and Roach (1984, p.13) argue that "Competencies are cultural-specific and, … behaviours that are understood as reflection of competency in one culture are not necessarily understood as competent in another culture".

Other differences observed include the fact that while they ranked Impact and Influence at a high level (# 2), our respondents ranked Leadership and Influence at a low level (# 12). This difference may be due to a difference in terminology. Their label did not include the word leadership. While their respondents ranked achievement at the top, our respondents ranked it in the middle approximately. In general, the differences in results between Spencer and Spencer's' study and ours could be due to the fact that theirs was conducted more than 10 years before ours. Also, they focused on many countries whereas we focused specifically on Thailand. In addition, they included not only software developers but other related professions and practices.

In terms of demographics, we note that we had a slightly larger group of men than women respondents although we conjecture that the differences in gender are too small to account for any of the results. It was beyond the scope of this study to differentiate rankings based on gender. However, it would be interesting to observe whether, for example, females ranked higher than males the competencies such as emotion and ethics or relation and communication. We do not know whether fact that the largest group in terms of years of experience had only three year may have influenced the rankings. For example, it is possible that those with fewer years or experience may rank differently than those with more years of experience. We collected and provided demographic information on respondents in order to ensure that our group was not too weighted towards a particular demographic e.g. all males and few females. Our demographic appears fairly balanced we believe. However, in future studies, it may be of interest to study differences or similarities in rankings between for example females versus males or those with few versus a large number of years of experience.

CONCLUSIONS, LIMITATIONS AND IMPLICATIONS

The purpose of this study was to prioritize/rank 12 existing software developer competencies and to find the pattern correlation among these competencies. A survey was designed to elicit responses from a target group (N=350) of software developers, system analysts, lecturers in Information and Communication Technology (ICT), ICT managers and others related to software industry (e.g. information technologist, software architect, computer technicians) in 14 organizations in Thailand. The return rate was 80.57% or 282 out of 350. Data was analysed using descriptive statistics. Factor analysis was used to identify correlations among the 12 competencies.

The 12 competencies were previously identified in a study of competencies for software developers in Thailand. The ranking was as follows: expertise; teamwork; logical thinking; system thinking; relation and communication; creative thinking; achievement; future thinking; emotion and ethic; flexibility; service mind; leadership and influence. In terms of correlations Future Thinking System Thinking Relation and Communication Teamwork are correlated. The second set of correlated factors are as follows: Leadership and Influence; Expertise; Emotion & Ethic; Flexibility. This research was limited to an investigation of competencies for software developers in Thailand only.

Our study was limited to one country, Thailand. As Spencer and Spencer's study has shown, results may have been different if other countries had been included in the sample. We do not know if our results are specific to Thailand. Other researchers may wish to use our survey in their countries to compare rankings. Our results may have been different if our survey had been designed differently. For example the survey listed expertise at the top and respondents ranked it at the top. We could have designed the survey so that not all respondents received a survey with the items ordered the same way. This approach may have yielded different results. The fact that we did not conduct our study to take

into account the demographic elements limits the breadth of our findings. Other researchers may wish to identify if competencies might be ranked differently based on certain demographic factors.

In terms of implications for organizations, these competencies should be part of human resource development, i.e. for selection, training and development, performance appraisal, and succession planning. The correlation between competencies for software developers shows that software developers should be competent in Teamwork Thinking (Factor 1) and be a Leadership professional (Factor 2). When organizations or institutes in Thailand use competencies for staff development or training, they should group related competencies. On the other hand, however, competencies that are not correlated (i.e. Logical thinking, Creative thinking, Achievement, and Service minded) may be considered important in contexts of staff development or training but not as important as the two factors. The same would be true for terms of implications for educators and curriculum content.

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E-Learning Methods as a Driver for the Internationalisation of Web Development Courses

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ABSTRACT

Over the past decade, as software development has moved from a platform specific, desktop based software approach to a web focused environment, the ability to develop courses for wider delivery has increased. At the same time university courses have undergone major changes in teaching mode, with an expectation that online versions of teaching materials should be delivered as readily and to the same quality as in-class materials.

This paper examines how the re-development of course materials to support online (off-campus) students as well as on campus students provides an opportunity to deliver those same materials to overseas partners. This is brought about by the need to select programming environments that are readily available to online students, along with detailed learning materials that allow online students to work at the same level of detail as on campus students. The integration of freely available and easily configurable development environments and teaching/assessment items based on those environments provide the opportunity for international teaching partners to support both their staff and students. This support comes from not having to rely on expensive, difficult to configure software systems, and by providing learning materials that are written specifically for those environments, so that both configuration and use of the environments form core elements of the teaching process. Examples of this process from a number of web programming are discussed in the paper, as are the results from both the local and international perspective.

Keywords: E-Learning, Web Development, Programming, Teaching Practice

INTRODUCTION

E-learning has evolved from a novel method of content delivery used by a small number of web literate staff to a standard mechanism by which universities and training organisations provide access to their learning materials and institutional resources. E-learning has changed and is continuing to change the landscape of higher education and training, especially within the halls of modern universities (Dreher, Cummings et al. 2006). There appears to be an expectation from students, both local and external to any given organisation, that they will be able to study a part or all of a course via the web, entirely removed from the campus and the classroom. This has certainly put the onus on universities and on individual lecturers to ensure that the materials being delivered via the web are done so at the same level of quality as they would be for traditional in-class teaching (Horton 2002; Nelson, Bhagyavati et al. 2005).

With this change in university teaching and learning in mind, this paper will examine the case of a school of computing and information science located within Western Australia, focusing on how the evolution of teaching practice and materials to suit both online (off-campus) and on-campus students has resulted in far more efficient delivery of the school's courses not only to these students, but to the school's international partners.

BACKGROUND

The school in question offers a number of courses, ranging from computer science to library and information science, with qualifications ranging from Diplomas through to PhD. Each course is comprised of a number of units, each unit focusing on a specific topic and running for 12-13 teaching weeks. Each unit usually contains a lecture and a lab / workshop component, with assessments being multiple assignments and an end of semester examination.

From 2002 onwards the school has implemented a policy of developing a nearly ubiquitous e-learning presence of a majority of the units and courses, so that all but a handful of units are now available via the web, delivered via the Blackboard Learning Management System. As well as all lecture and lab / workshop materials being available via each unit presence in Blackboard, audio/video tools are also used to enhance the fidelity of the learning materials. These tools include Camtasia 5.0 for integrated lecture slides/audio/animation as well as screen captured images and video. The units and their resources are regularly audited to ensure that the content, the assessments and all related unit resources are being delivered in such a way as to provide as much as possible a similar learning experience to the online students as to the on-campus cohort.

As well as delivering these courses and units to on-campus (or in-class as they will be referred to) and online students, the school has a number of international partners who purchase the materials, assessments and staff moderation so that the courses can be delivered in their own country to their own local students. These partners are spread from the southeast of Asia through to India and Africa, with each having their own local teaching methods and I.T. infrastructure. This last point was, for some time, a crucial issue when delivering computer science topics internationally, where specialist software installations were required in order to correctly establish a learning environment. Computer labs setup for programming students would often require expensive licenses, specialist server installations and any number of custom settings in order to create an environment in which students could begin their lab / workshop and assessment work. Outside of the campus labs, for both online students and the international partners, creating such a specific environment could be difficult, if not impossible. As the remainder of this paper will show, solving the problem of I.T. environment setup for local online students actually solved the problem for the international partners, at least in terms of the web programming units taught by this author.

WEB PROGRAMMING ENVIRONMENT

During the last decade this author has taught a large number of different units, from basic research skills through to database security and most things in-between. However it is web programming and web application development that is the main teaching focus for the author, and the area in which the most amount of change has occurred in unit content delivery. The three primary web programming units taught by this author have been discussed in previous papers, but in summary they examine client-side markup systems (xml, xslt, css, xhtml), client and server-side web applications (xhtml, php, mysql) and server-side applications specifically (php, asp, asp.net). To simplify the following discussion these three units will be referred to respectively as Markup, Php and Dot Net. This paper does not claim that in the context of web programming these three sets of technologies and environments are the only tools that are available (Barbour 2004), only that they have evolved to meet this author's teaching needs and the needs of his students.

Each of these units has specific requirements in respect to the software tools required for students to actually develop applications relevant to their lab materials and assessment specifications. The following discussion of each unit will detail the development of the unit, the software tools required and the current state of the unit content and technical environment. It should also be noted that whilst in the past the international partners received cd-rom images of the course materials contained within the schools previous in-house learning management system, they now have access to their 'own' version of a unit in Blackboard, copied directly from the last semester's materials as delivered to this

author's local students. This means that lecturers such as this author do not need to keep two systems updated, and that a majority of materials, resources and approaches used for local students can be used for delivery of courses to international partners.

MARKUP

Of the three units discussed in this paper Markup has always been perhaps the easiest to teach online and internationally due to the simple teaching environment required, namely a capable text/html editor and a selection of modern web browsers, such as Internet Explorer and Mozilla Firefox. As there is no requirement for a web or database server, all the code can be written in the editor and parsed via a web browser to display the resulting application. Though over the last five years Markup has evolved from a primarily html oriented unit to a much more xml and xslt focussed offering, it has always been the easiest to deliver outside of the classroom, and in many ways provided an impetus to change Php and Dot Net so as to achieve the same results. Markup can be delivered on any operating system environment that has provision for a graphical user interface and the aforementioned text editor and web browser, meaning that online students and international partners using Microsoft, MacOS or Linux environments can utilise the learning materials to the same level. The lecture and lab / workshop files are delivered as .PDF documents so as to ensure cross-platform compatibility and, where possible, most if not all audio and video materials are delivered in MP3 or Adobe Flash format.

Other course and unit authors looking to design a web development unit for online delivery could certainly do worse than to start with a Markup like unit, where levels of technical difficulty could be staggered from simple html web pages through to advanced xml and xslt driven client side web applications such as in the case of Markup. The limiting factor in the latter case is no longer the technical learning environment, but the ability of the online student or the international partner to support any queries or misunderstandings about the learning materials. This problem is mitigated to a certain degree by the 'extra' materials that this author adds to each unit, such as an audio/video summary of each weeks lecture and lab, so that the online students are alerted to any tips, tricks or queries raised by the in-class cohort. As these same materials will be used for the overseas partners in the semester that follows, these 'extra' files help their students and lecturers just as they help the local in-class and online students.

PHP

In its earliest days the Php unit was extremely challenging to teach on campus, and was not even considered for online delivery (Brown 2006). Initially the unit required a central server on which Perl rather than Php scripts could be run, and in order for students to run their scripts they had to write them on a local machine in the computer lab and then upload them to the central server using ftp. Each student in the class required an account on the server machine and whenever the server went down it had to be manually rebooted in short order to stave off emails from panicked students. Eventually the environment moved to php and mysql hosted on machines in the labs, though the setup was still quite specialised as it required the php plug-in to Microsoft's Internet Information Services (IIS) web server running under XP Pro. This presented further difficulties as students typically had Windows XP Home which did not support IIS, or if they did have XP Pro they did not have the original discs to install IIS from. Whilst Php is a cross platform scripting language which can be plugged into almost any web server on any operating system, setting up Php with the most popular web server in the world, Apache, was still a non-trivial exercise. Even before the unit went 'online' students were trying to set up home web servers so that they could work on their labs and assignments outside of the classroom. Aside from those students lucky enough to have the same systems at home as on-campus in the labs, most would try to cobble together a working php and mysql alternative environment and hope the code worked in-class as it did at home. Such configuration issues caused massive headaches in consistency, from the teaching and learning perspective and from the assessment grading perspective. Mysql also provided numerous problems for this author and students working outside of class as easy to use and install interfaces to the database were not widely available at the

time, whilst the added problem of configuring Php to work properly with Mysql also arose as the two environments gradually diverged from working as closely with each other.

Delivering this unit to the international partners was always extremely challenging and frustrating, both from the perspective of this author and the staff and students overseas who were trying to come to grips with not just the coding content of the unit, but the fundamental setup required just to get started. Each semester required dozens of emails to be exchanged between this author and the local lecturer in order to 'help' get their local systems up and running, systems that were usually very different from those used in the local labs. It was obvious that a solution was required that would work just as well for the local students as well as those overseas, preferably in a way that each student could download a pre-built environment provided to them and just start working. This is exactly the solution that occurred at almost the same time that it was decided to deliver the Php unit online as well as in-class.

At the time a number of integrated web and database development environments began to appear, no doubt to address the issue for novice developers struggling to configure their development environments before even getting to work on code. Of the tools available at the time XAMPP from the Apachefriends organisation (http:///www.apachefriends.de) was perhaps the most suitable to all facets of the Php unit. It included a single file installer that set up Php (in later versions both Php 4.x and 5.x), the Mysql database, a web based interface onto the database called PhpMyadmin plus an integrated console to individually start and stop these services (see Figure 1).

Figure 1: Xampp Server and Web Interface

As well as offering an easy to install, integrated system, XAMPP was also cross platform, allowing students to deploy the same system to Microsoft, MacOS or Linux operating systems. At the time that XAMPP was adopted as the primary scripting/web server/database server environment for the Php unit, the unit itself was totally re-written with XAMPP as the basis of all lecture examples and all lab materials. All assessments were to be marked using XAMPP, giving students confidence that if their assessment code worked for them, it would also work for their instructor. The very first lab session in the unit was spent getting students to download XAMPP and install it, locate all the required folders for the web and database servers, and explore the PhpMyadmin interface. As well as being provided a link to the XAMPP website where they could download the latest configuration of XAMPP, a pre-configured version was put together by this author, specifically designed to run on student home machines as well as in the university labs.

The transformation in teaching the Php unit, both to the local online students and the international students was quite remarkable, with the issue of configuration disappearing almost immediately. In-class students could work at home, online students could work at home and the international students could run whichever version of the server they liked on either their local campus computers or home computers, all with the same consistent application architecture. The level of work being returned from all students, regardless or delivery mode, has improved significantly with the re-write of the unit, where the emphasis can now be purely on the coding and not on spending weeks trying to configure a workable development environment. Perhaps the most telling result of this move to online teaching and the sourcing of such an effective development environment is that not a single email exchange has

been required between this author and any overseas partners in relation to setting up the technical environment for the Php unit. With the addition of the 'extra' materials as discussed previously, alongside an exceptionally good textbook, the transition to online delivery has been extremely successful.

DOT NET

This unit was given to this author to teach relatively recently and at the time required a total re-write, a process that benefited greatly from the experiences in the Php unit. As the Dot Net unit was designed to give students hands on skills in a number of different server-side environments, so that they could compare and contrast tools and methods, the ones chosen were those that offered the ability to be deliverable online and internationally. For the first half of the unit students are exposed to Php and Asp, and are required to develop and deliver a specified application in both environments. Obviously the Php component was no problem as the server environment and teaching materials from the Php unit were easily integrated into the unit's resource list. The Asp aspect of the unit was more of a challenge for, as with the earlier versions of the Php unit, many students did not have the necessary operating system to run IIS. This problem was largely overcome by pointing students towards the BabyWeb server, which is a tiny, free web server that runs nearly all of the necessary Asp commands and is a single file install. Though it is not cross platform, it still allows any student running any version of Windows to develop their Asp labs and assessments.

For the second half of the unit students are required to develop and deliver an assessment using Microsoft's Asp.Net development environment, in this case assembled using Visual Studio 2005. While Visual Studio is licensed software and too expensive for most students to purchase for one assessment, Microsoft has joined the trend of providing 'lite' versions of big software, this time in the form of Visual Web Developer 2005 (and now 2008). These environments have the Asp.Net tools only rather than the entire range of Microsoft languages and platforms. Included with this free version of the Asp.Net environment is the Microsoft Development Environment (MSDE), essentially a 'lite' version of Microsoft's Enterprise database system Sql Server.

Students are provided links to the 'lite' versions so that they can download them, whilst all lab materials are written using Visual Studio 2005, but using only those features that are available across all versions. To date, local online students and international students have had no issues in downloading and configuring the Asp.Net environment, and whilst the Dot Net unit is not as cross-platform as the other two development units, this has as yet not proved to be an issue.

ONLINE THINKING

This author has argued in other papers that by targeting teaching and learning materials and associated resources specifically at online delivery, with the aim to create a learning experience that as closely as possible parallels that found in-class, all possible student cohorts will benefit. The in-class students are probably over catered for as they have the dual benefit of on the spot instructor assistance as well as access to the 'extra' resources aimed at bridging the cognition gap for the online students away from class (Garrison and Anderson 2003). The online students have access to the same teaching and learning materials and technical environment as to the in-class students, plus the 'extras', driven by the experiences of the in-class students. The international students and their instructors enjoy the same benefits as the online students, typically in the semester following that cohort. The best practice elements developed for the local online students, where feedback regarding materials and delivery can come in on a weekly basis, is rolled into the international materials in a constant plan->do->review cycle.

Of course the obvious issue that arises in this particular instance is that such an iterative cycle of improvement requires a great deal of effort on behalf of this author and presumably other academics

committed to providing as high a quality learning experience as possible to those outside the classroom. Computer science topics, particularly web development, are heavily disposed to constant change and rarely provide the opportunity for static content (Venkat, Jagadeesh et al. 2006), assessment or teaching practice.

By 'thinking online' academics can essentially kill three birds with one stone, catering to their in-class, online and international partners, rather than trying to treat each as a separate entity. Some authors in the literature have gone further, customising course materials on a per-country basis (Lee 2002), which in the context of the units discussed here would be untenable. It is this author's experience (and belief) that treating course materials, assessment and teaching practice differently for the three cohorts identified in this paper dilutes each cohort's learning outcomes and actually creates more work than the practices identified above. Figure 2 below represents elements of this online focus along with the plan->do->review cycle, where capturing events from in-class teaching informs the 'extra' materials to close the fidelity gap for the online students, which in turn feeds into a more comprehensive, self-contained curriculum for the international partners.

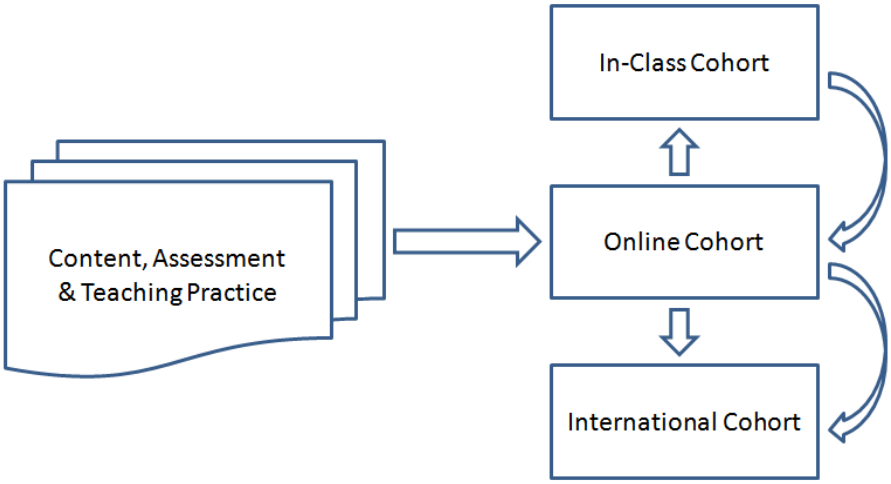

Figure 2: Online Content, Assessment and Teaching Practice Model

This concept of self contained curriculum is particularly important when looking to deliver units and courses of teaching to international markets, as by and large it would seem unreasonable to say to a partner "here is all the content, but as far as teaching practice and environment is concerned, you are on your own". By designing units to contain high quality content, with established development environments included, teaching delivery can then be largely driven by the students themselves. In such a model, the academic staff member assumes their appropriate role, one of a learning facilitator, not instructor of rote learned training. It is this authors experience that the greater the input into online course development, the greater the learning outcomes for any students who consume those materials.

CONCLUSION

Most lecturers in most universities in most countries around the world are no doubt well along the path to transitioning their own particular in-class learning materials and teaching practice into the online medium. This paper has examined the case of one such lecturer who has spent half a decade or more trying to develop a comprehensive framework of content, assessment, teaching practice and supporting resources that not only satisfy the more challenging learning scenario experienced by online students, but by all students. In this process of addressing online teaching and learning the often vexed issue of delivering highly technical, computer science based curriculum to international partners has, to a significant degree, resolved itself.

International partners utilising this author's unit materials receive the same materials, same assessments and same technical environments as the local in-class and online students, and apart from some differences in procedures for submission and marking of assessments (which is conducted at the partners end) these units now run as easily overseas as they do locally. This makes the delivery of such content to international partners much easier for this author, for the school, for the partner's lecturing staff, and above all, for the international students themselves. While this paper does not claim to any radical reform in online teaching and learning, what it attempts to demonstrate is that a focus on completeness and consistency of learning materials, assessments and resources for online units of study will generate tangible benefits beyond just the online audience (Dreher, Cummings et al. 2006). Table 1 below outlines some of the most basic constituents of technical units (i.e. web programming) that this author adheres to when developing content for online and international partners.

Lectures	• Where using screenshots, should use the 'environment(s)' used in the computer labs • Documents as .PDF documents • Do not use colloquialisms that international students will not understand • Provide audio 'summaries' alongside the lecture files as individual .MP3 files (and refer to each slide number when discussing the slides)
Labs / Workshops	• Spend first week getting students to set up, install and test their working environments • All lab / workshop / tutorial sheets should use the specified development environment for all examples and screenshots • If at the end of any in-class lab / workshop something particularly difficult is encountered, discuss it in an audio/video 'extra' and put it up for the online students promptly (within the same week) • Each week should be scaffolded, so that a single, consistent 'system' is built over the period of several contiguous labs / workshops, rather than totally unrelated topics each week (Paxton and Heredia 2004; Athauda, Kodagoda et al. 2005) • Do not have separate lab / workshop materials for in-class and online students
Assessments	• Assessments should be relevant to the concepts and skills covered in the labs / workshops. As an example, if an assessment requires an application to add, edit, update and delete data to a database from a web form, those skills need to be covered before that assessment is due • Assessments are to be marked in the specified development environment as provided to the students • The assessments should have requirements that match the lab / workshop materials, but not be based on the same examples (i.e. making students apply the same concept in a different context) • Provide for 'extra marks' in any assessment so that skills and concepts above and beyond those taught in the lab / workshop can be added by particularly capable students • Do not have separate assessments or assessment requirements for in-class and online students • Assessments should be authentic and not off a type that could easily be downloaded from free 'scripts' sites (Brown 2006; Wang 2006; Brown 2008)
Resources	• Provide the development environment, or links to the environment within the online materials • Ensure that development environment is free, and where possible, cross-platform • A textbook with examples that take students through building working applications is essential for online web programming units – though can be hard to find (Sahama, Ho-Stuart et al. 2004) • Make heavy use of online tutorials from the myriad of web coding sites • Create 'tasks' which students must complete after reading these tutorials "associating an activity with a curriculum", p. 1101 (Kam, Ramachandran et al. 2007)

Table 1: Minimal requirements for units developed for online and international students

Those facing the challenge of creating an online presence for their technical, programming related courses of study will hopefully find some of the previous discussion useful, and perhaps even applicable to their particular situation. The initial process can be extremely time consuming, especially in terms of materials writing and selection / integration of the requirement technical environment. Whilst this paper has really only scratched the surface of what has been the ongoing, iterative work of upwards of a decade of teaching web programming, hopefully it does show that the investment in the time and effort required to achieve high quality online learning is indeed worthwhile. This is particularly true when considering that a correctly designed curriculum and its resources will address the needs of both a 'local' online community of students and the greater community of students found in most international partnership programs.

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My Media Trainer: An Innovative, Interactive Resource to Ensure Sustainability in the Training of Media Professionals

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ABSTRACT

Communication and media play a crucial role in both message delivery and the empowerment of people in their own development processes. UNESCO has been actively engaged in trying to build capacity among media professionals to equip them with training in sensitivity to issues, the different formats that they can use to disseminate information, and how best to get the information to the people who are most affected by it (Khan, 2008). One of the challenges of educating large numbers of professionals, particularly in developing countries, is a lack of trained teachers. To meet this challenge, UNESCO commissioned the development of an interactive training program that would innovatively use available technologies for introducing media professionals around the world to the basic knowledge and skills in curriculum development, pedagogical planning and implementation, and evaluation processes. A combination of the use of information and communication technologies (ICT) and new and innovative approaches to teaching and learning can help to address the issue of access to education. The development of this training package and the pedagogical and instructional design decisions made to ensure equity and sustainability across trainer contexts in a flexible delivery format with a student-centred focus will be examined in this paper. It is hoped that this can assist others in the development of similar educational resources. The project aim was to ensure that media professionals have equitable access to knowledge and skills in effective training practices to develop as trainers and in turn to be effective in inducting new colleagues into the profession.

Highly positive evaluations of the CD-ROM from geographically diverse learning contexts are included to demonstrate how this training program succeeded in meeting its brief.

BACKGROUND

In the burgeoning and increasingly complex media environment of the 21st century, the professional media practitioner requires multi-skilled competencies as never before. It is now commonplace for news agency and print journalists to file their written stories for a newspaper, magazine or agency and, at the same time, submit video and audio coverage of the same event for on-line distribution. Such is

the dimension of the new journalism and the public's expectations of instant and unlimited access to news and information resources, many newspapers are now uploading their first editions for on-line consumption on the Internet before the traditional daily printing and distribution method. Just as print journalists write for many genres, radio reporters now pack a digital still camera and camcorder when on assignment, while television crews are expected to submit live video footage for both on-line and broadcast access, as well as for repackaging into subsequent alternative digital media formats.

Given the changing role of the media practitioner, the need for training, retraining, skills upgrading and human resource development is surging as knowledge industries begin to increasingly overtake 'rust belt' communities as the key drivers of economic and social advancement. For the first time, so-called developing and least developed countries are facing the possibility of harnessing technologies in such a way as to ensure that they are at the forefront of change and whole nations can cross the digital divide. However, in many countries, developmental progress is being thwarted by a lack of skilled training personnel available to undertake the task of providing the necessary practical and theoretical training to fellow colleagues. For example, in national media agencies, especially in Asia, trainers often evolve from within the ranks of existing professional practitioners. In other words, an experienced journalist might be asked to initiate and operate a short-term course for new reporters, or a competent video camera operator could be called upon to deliver a technical training course for an incoming cadre of potential camera crews. Often, the trainers themselves have little knowledge of modern training practices or the structure, methodology, implementation and evaluation of courses and programs for adult learners, and thus deliver courses based on their own school or university student learning experiences. In an increasingly complex training environment, professionalism is key to ensuring effective skills upgrading outcomes.

By way of seeking to partly address the training dearth, in September, 2006 the Communication and Information Sector of the United Nations Educational, Scientific and Cultural Organization (UNESCO) approached the Centre for Communication and Social Change in the School of Journalism and Communication at The University of Queensland with a view to the development of "a manual for a training of trainers course (TOT) for media organizations. The deliverables may consist of a printed handbook with a highly interactive computer-based learning CD-ROM" (Padhy, 2006). However, UNESCO asked the Centre for "any alternative idea on this issue" (*ibid*) should some other format be seen as potentially more user-friendly and effective. The Centre proposed to UNESCO that a generic, CD-ROM based *Training of Trainers Teaching and Learning Resource Package* be developed to support the work of media training personnel, especially in emerging countries where new media is now affording greater participatory possibilities than in the past (Hadlow, 2006). The package would enable trainers to engage with new methodologies of adult learning, to develop new teaching skills and to advance their professionalism in both traditional media and new technological fields. As a result, a project team was developed comprising School academic staff, external consultants and a development team from the University's Teaching and Educational Development Institute (TEDI) Educational Resources Unit.

The team adopted the philosophical approach that a sustainable training package must take into account several considerations including the nature of the learner, pedagogical underpinnings and sound instructional design considerations that tied the theories and practices of learning and teaching to principles of learning with technology. In particular, the team was cognisant of the media training landscape in so-called developing and least developed countries where, often, professional broadcasters, print journalists or mid-level media managers have few, if any, academic qualifications, and have been unable to access formal training-of-trainer programs or to study adult learning techniques. Thus the team aimed to create a user-friendly training package while, at the same time, ensuring the transfer of learning experiences in a systematic, methodologically sound and attractive manner.

A key aim of this paper is to demonstrate that, given a particular brief, context, and philosophical base, development of technologically-managed professional training requires consideration of learner,

technology, and content to ensure appropriate and effective training. Thus we now turn to consider both the resource design and content development facets in the development of this resource, followed by positive information evaluation responses, confirming the soundness of the instructional and content design.

INSTRUCTIONAL DESIGN CONSIDERATIONS

Instructional design brings theories and practices of learning and teaching to principles of learning with technology in creating learning resources that best suit an identified educational need within a specific defined context and learner group. On the one hand are the instructional design methodologies centred on the commonly accepted ADDIE model: analyse, design, develop, implement, evaluate (e.g. see discussion by Molander, 2003); however it is Bower's recently proposed "affordance analysis e-learning design methodology" (2008, p.8) that most accurately reflects and guides the instructional design intent in developing the *My Media Trainer* resource. The key notion underpinning the methodology is that educational goals lead to the consideration of tasks appropriate to the goals, but it is considering the characteristics of tasks with the characteristics, or affordances, of technological tools that leads to the most appropriate instructional design.

First, the team considered the learner group and their educational needs. As already discussed, the target group would be media professionals anywhere in the world, particularly developing nations. Thus, several key characteristics are evident: computer access was assumed but high quality access to technology, reliable access to Internet and greater bandwidth could not; the trainer will use the tutorial independent of any institution, instructor or other support network. From this, the design and development team determined a number of affordances for the resources which guided the design decisions (see table 1 below). The decision to develop a graphically enhanced html-coded CD-ROM resource allowed us to address the technical affordances (avoiding issues with access to Internet or bandwidth, ease and low cost of postage compared to print materials); media & synthesis affordances (could integrate text, interactive activities, videos, other resources, diagrams); useability (ease of noticing how the tutorial works and what to do – intuitiveness); and reliability (could likely be used on most computer facilities, with no reliance on special effects other than a non-crucial introductory video for each section). In addition, the team could address envisaged learner needs through temporal affordances (a CD-ROM can be used anytime, anywhere, by anyone); navigational affordances (learners can see the menu by sections, can move back through completed sections and pages although they must complete each page and section in a linear progression, can leave and return to their last position at any time); access-control affordances (users are limited to independent learning but the coding allows ease of updating information from a developer's perspective. User-learners can print each page if preferred or desired); and aesthetics (a clear, clean, calm image - each page is presented with effective and consistent use of headings, layout, white space, and graphic images to denote learner activity).

Figure 1: Affordances required and met through design decisions.

Need	Affordance (Bowen, 2008)	Design decision
Access to technology: low Internet, computer capabilities (variety in non-specific intended users)	Technical affordances; Spatial affordances Reliability	CD-ROM - easily transported, no issues with bandwidth and Internet access; more affordable to send than paper; variable screen sizes applicable through right hand margin and text display.
Experience of the entire learning sequence by busy professionals	Temporal affordances; Navigation affordances; Access-control affordances	Accessible on any computer by any person at any time; users can leave the program and return to where they were up

		to; each page is printable in black-and-white; users can move around already complete sections/pages.
Autonomous learning, no required support teacher or facility, stand-alone resource	Useability	Simple layout and design; consistent presentation and layout; menu visible, consistent graphic images.
Interesting, motivational, learning success	Media affordances; Synthesis affordances; Aesthetics	Combines/integrates text, interactive exercises, short video images; clear, clean design with reference to media profession.

In addressing the need of users to be independent of time, place, institution and support systems, this resource was developed in line with Taylor's 'computer as tool' use of computer technology in learning contexts (1980). Accordingly, the tone of language is conversational – as if a teacher is speaking to the user. Successful independent learning is also assured by following several characteristics listed by Alessi and Trollip (2001): introductions (to tutorial and to each section) inform users about purpose, what to expect, directions to other parts of the resource (such as self-tests, learning contracts and resources) and simultaneously model appropriate introductions to training; locus of control is assured whereby the user decides when to move through the learning sections and pages, they can leave and return to the same place in the tutorial, can elect to print any or all pages, print out learning contracts and journal pages, can access the resources at any stage; clear transitions and consistent layout and presentation; and sufficient, succinct instructional text.

Finally, the resource addresses issues of cognitive working load which can affect learner interactions with elearning and their ability to learn. Derived from Ally (2004). The resource

- places important information at the centre of the screen – in this tutorial, students move from narrow left-hand navigation (the choices to make and navigation source) to a wide information 'page' on the right and centre;
- highlights critical information and organises text clearly – new tutorial pages are presented for each new learning point, headings are used to organise sections of learning within the page and highlight the content, dot points help to organise text, as do charts, and short, simple sentences are used for ease of online reading and potential non-English speaking background users;
- expresses the purpose of each component – through the use of an introduction for each section;
- chunks or minimises text on screen – the organisation of content into separate pages of similar length, attending to a separate component of content assists in this notion as does the use of headings to clearly identify text purpose, designing white space to reduce on-screen crowding of text, and using dot points, tables, and other diagrammatic means of chunking or minimising text.

Thus, instructional design considerations address how the needs articulated in a design brief, or instructional intent, are best met through informed choices about technological characteristics to apply. Good instructional design brings decisions of teaching and learning together with affordances of technology within the contextual constraints. Accordingly, this resource adopted a simple, clean presentation with few fancy interactive elements to take into account not only users' time and financial constraints but also unknown potential constraints with quality of computer technology and access to Internet and broadband available to the user-learners. These instructional design decisions were determined in conjunction with the content development considerations in an on-going design cycle. This paper now reflects on the content design considerations applied during the development of the *My Media Trainer* resource.

CONTENT DESIGN APPROACH

The underlying pedagogical theme of *My Media Trainer* is that teaching adults is fundamentally different than teaching children. To reinforce this theme, the content of the resource is founded on the early model of adult education developed by Knowles where he described five defining characteristics of the adult learner (1970):

- **Self-concept** - As a person matures his self concept moves from one of being a dependent toward being self-directed;
- **Experience** - As a person matures he accumulates a growing reservoir of experience that becomes a resource for learning;
- **Readiness to learn** - As a person matures his readiness to learn becomes oriented increasingly to the tasks of his various roles;
- **Orientation to learning** - As a person matures his time perspective changes from one of postponed application of knowledge to immediate application and accordingly, his orientation toward learning shifts from subject-centred to problem-centred;
- **Motivation to learn** - As a person matures the motivation to learn is internal rather than externally driven (Knowles et al, 1984).

My Media Trainer was designed to cater to the adult learner - to produce an effective adult learning tool, and very importantly, to give a tangible model of the appropriate training approach. The resource develops a practical knowledge of the characteristics of adult learners in the section 'Setting the Climate for Learning'. In the segment 'The Adult Learner and the Learner-centred Approach', there is an interactive exercise, which details the characteristics of adult learners and challenges users to think about and key in the implications of each characteristic for training adults. Once the user has keyed in their thoughts, the CD-ROM provides access to additional suggested ideas. Holistically, the CD-ROM is designed to model the team's adopted approach to adult learning. Thus, throughout the CD-ROM, the user experiences approaches and techniques strongly based on the learning principles listed above, learning the key concepts through experiencing the self-guided learning program.

- Participants are encouraged to work at their own pace. Self-tests are provided to allow users to assess their own learning (*self concept*).
- Exercises are interactive and provide the learner with opportunities to contribute their own knowledge. Rather than didactic, this means learning is more akin to self-discovery (*experience*).
- The CD-ROM is premised on the user having a real purpose for developing training skills; for professionals who have a real and immediate need – a workplace requirement to train others and thus it is a step-by-step train the trainer guide (*readiness to learn*).
- Users are able to immediately apply their learning - the 'Training Resources' section contains media competency sets, materials, readings and tools that can be used in running a media training course. These resources are available throughout the learners' time spent completing the materials and each page is printable to enable users to keep as a record or to use in their training of others (immediacy in *orientation to learning*).
- Reinforcing the internally-driven motivation of adults, the CD-ROM also contains a tool called 'My Learning Diary' in which users can plan their goals, their learning activities, self-assessment and self-reward (*motivation to learn*).

Figure 2: My Media Trainer approach and the adult learner.

Characteristics of adult learners	***My Media Trainer* approach**
Self-concept – self-directed	Self-paced, self-instructional tool, self-tests.
Experience – a resource for learning	Interactive exercises that stimulate thought.
Readiness – learning tasks relating to a role	Designed to help media professionals

	develop specific trainer competencies (knowledge, skills and attitudes).
Orientation to learning – immediate application	Training Resources section contains training materials, tools, readings.
Motivation - internal	My Learning Diary for planning learning.

Extending Knowles model of the adult learner presented above, he later proposed a seven-step process for training adults (Knowles, 1980). This process was applied in the design of the content of this training package:

1. set a cooperative learning climate
2. create mechanisms for mutual planning
3. arrange for a diagnosis of learner needs and interests
4. enable the formulation of learning objectives based on the diagnosed needs and interests
5. design sequential activities for achieving the objectives
6. execute the design by selecting methods, materials, and resources
7. evaluate the quality of the learning experience while re-diagnosing needs for further learning.

The content segments of *My Media Trainer* were specifically organised to reflect these seven steps:

1. Setting the climate for learning
2. My learning with subsections My self-assessment tool and My learning contract
3. Identify learning needs
4. Develop a media training course, specifically the segment Write aims and objectives
5. Design a media training module, specifically the segments
    a. Prepare a lesson plan
    b. Training techniques
    c. Apply effective learning methods
6. Evaluate your course

Each section on the CD-ROM provides information and interactive exercises, as well as a complementary self-tests and learning resources. In addition to providing appropriate content, the recourse is also designed to model each step in the adult learning process with a particular focus on the adult learners' characteristics of independent, internally motivated learners. Examples of this are (see also Figure 3):

1. The CD-ROM is at its core self-instructional, self-paced, interactive, relevant to a specific role and provides for self-motivation, self-direction and self-testing.
2. A planning mechanism is provided in My Learning where, on the basis of a self-analysis, users are invited to set goals and plan their learning via My Learning Diary and My Learning Contract.
3. In diagnosing their own learning needs, learners reflect on and make use of a full set of Media Trainer Competencies and a Self-Assessment Tool.
4. Each section contains a set of learning objectives written in behavioural terms describing desired learning outcomes thereby providing examples of how learning objective are defined.
5. Each section has been uniquely designed to provide a series of segments containing sequences of activities for achieving desired learning outcomes.
6. Learning techniques appropriate to each topic are provided in each section and resources made available in the Training Resources section.
7. Self-tests at the end of each section give users the opportunity to test their new knowledge and My Learning Diary allows users to gauge the extent to which they have achieved their learning goals.

Figure 3: My Media Trainer and adult learning.

Adult training process	***My Media Trainer* design**
Create mechanisms for mutual planning	Learning contract, learning diary.
Arrange for a diagnosis of learner needs and interests	Media trainer competencies, self-assessment tool.
Enable the formulation of learning objectives based on the diagnosed needs and interests	Behavioural learning objectives define desired outcomes for each section.
Design sequential activities for achieving the objectives	Sections contain topic segments with relevant activities.
Execute the design by selecting methods, materials and resources	Varying learning techniques used and resources provided.
Evaluate the quality of the learning experience while re-diagnosing needs for further learning	Self-tests, learning diary.

Thus, designing the content for this resource was based on sound theoretical principles and involved much more than simply determining the needs of varied media professionals. More significantly, it was designed to develop basic trainer pedagogical knowledge from planning through implementation to evaluation. Emphasis was also placed on demonstrating, or giving examples of, quality adult training practices to users. As a result, trainers are both told about training, and to the extent of an independent training resource, modelled training practices. It is the belief of the authors that an integrated approach to pedagogical and resource design is essential to an effective tool applicable for effective learning by the target learning group. Knowing whether and how this approach is effective, both informs our future iterations of this particular resource, as well as any future resource development. With this in mind, the paper now turns to the distribution and evaluation feedback of this resource.

DISTRIBUTION AND FEEDBACK

A CD-ROM version of *My Media Trainer* was produced in 25 copies for initial trials and product evaluation. Soon after, a further 150 copies were printed. A copy of the CD-ROM was also placed on the web-site of the School of Journalism and Communication at the University of Queensland (www.uq.edu.au/sjc). The web-site materials rapidly elicited comments and evaluations from several sources, including China and the Republic of Korea, while CD-ROM versions despatched to selected clientele also became the source of useful feedback. By late 2007, *My Media Trainer* was also available on UNESCO's Open Training Platform (http://opentraining.unesco-ci.org/cgi-bin/page.cgi?d=1). Below are some examples of the positive responses to the CD-ROM, demonstrating its relevance and usefulness to intended user groups:

- After evaluating and using a CD-ROM version, the International Journalism Department at the Kazakh State University in Almaty, Kazakhstan requested that they be given permission to translate *My Media Trainer* into the Russian language.
- In Shanghai, China, an Australian TAFE (Technical and Further Education) teacher providing training for Chinese trainers glowingly noted that "…this product will really help me to put courses together in Shanghai. It's like an expert system, really - SO useful in my line of work…" (Finamore, 2008)
- In Kuala Lumpur, Malaysia, the Secretary-General of the Asia-Pacific Broadcasting Union (ABU), an organization of 170 members in 53 countries trialled *My Media Trainer* and noted "I spent about two hours going through it last night and almost feel like a qualified trainer now!" (Astley, 2008) He went on to write that "It is an excellent product and we would be happy to publicise its availability through the ABU web-site." (*ibid*)

- In December, 2007 UNESCO highlighted *My Media Trainer* through presentations and workshops of the product at the Third Global Knowledge Conference (GK3) held in Kuala Lumpur, Malaysia. In 2008, a further two thousand copies of the CD-ROM version were printed in Brisbane and more extensive distribution was undertaken.

CONCLUSION

Long term sustainability is dependent upon empowering people through knowledge sharing and access to education. Journalists, in particular, play an integral role in disseminating information; however a key challenge for educating and up-skilling professionals in this, and other fields of expertise, is the design, development and accessibility of quality educational materials for trainers, particularly in developing countries. The instructional design of this educational resource ensures accessibility, engagement, and ease of use. The content is relevant to training trainers of adult learners and, at the same time, and very importantly, models the appropriate methodologies for facilitating adult learning. The *My Media Trainer* resource supports UNESCO's international role in facilitating development, knowledge sharing, literacy and poverty alleviation through the use of information and communication technologies to support access to quality education and training, especially in developing countries.

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Different Degrees of Blending Benefit Students Differently: A Pilot Study

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ABSTRACT

We are constantly seeking for the best method to teach our students. Lecture style which is in existence for many years is still applicable to a certain extent. The birth of personal computer and Internet has resulted in wide spectrum of instructional strategies taking advantage of these two wonders. One of them is blended learning. The model used in this experiment has online and offline modes. For the online mode we used forum discussions to replace face-to-face instructions. Lecturers are introduced to various online activities that they can choose from in the forum discussions. One of the important aspects of blended learning is the integration of offline and online activities. The other aspect of the blended learning model is the offline mode or face-to-face teaching in the classroom. This experiment lasted for four weeks involving three lecturers and a total of 73 students. Each lecturer was given different degrees of blending in this experiment, that is, 25% online mode, 50% or 75% the highest online mode. For instance, in a 25% online mode students do not attend class for one week in a 4-week experiment. This study shows that students do view the new teaching method in a positive manner as many of them on average reported improvement in self study and time management skills. Whether different degrees of blending benefit students differently, this pilot study tends to show that there is no significant difference between the 25% and 75% groups in self study, attitude toward blended learning and forum participation.

Keywords: Blended Learning, Degree of Blending, Collaboration, Online Forum Discussions, Instructional Technology, Internet

INTRODUCTION

What is blended learning? There are many definitions given to this term, the most common being blended learning combines face-to-face instruction with distance education delivery systems (Osguthorpe and Graham, 2003). Fox (2002) continued to define blended learning as "… the ability to combine elements of classroom training, live and self-paced e-learning, and advanced supportive learning services in a manner that provides a tailored learning …" (p. 26). Yes, this is tailored in the sense that the face-to-face teaching (offline mode) is integrated with e-learning (online mode). It is through integration of the two modes of learning that gives the true meaning of the word blended. We cannot have the online mode and the offline mode being taught as two separate entities.

In higher education, blended learning is often referred to as the hybrid model. In the University of Wisconsin in Milwaukee, hybrid courses have significant portion of the learning activities moved online resulting in time traditionally spent in the classroom is reduced but not eliminated (Vaughan, 2007). Bourne, a professor of electrical and computer engineering agreed that within five years 80 to 90 percent of classes could sometime become hybrid (Young, 2002).

How much of blending is needed for it to be effective? Allen and Seaman (2003) agreed that blended courses integrate online modes of delivery into the regular classroom in such a way that at least 30% of the course is taught online. In this experiment the degree of blending ranges from 25% to 75%. Many students who have tried blended courses say the model fits their attention spans and their lifestyles and a meeting of 50/50 is nice (Sarah Hangen, reported by Young, 2002). There are, in fact, an enormous variety of face-to-face ratios to online time but majority of them ranges from 25% to 50% as reported by Aycock et al. (2002).

The research aims to explore the students and lecturers' perceptions at the different degree of blending, that is, 25% online mode, 50% and 75% the highest online mode.

LITERATURE REVIEW

Blended learning has emerged as a preferred mode of delivery (Bersin, 2004; Eijl, Pilot, and Voogd, 2005; Tang and Byrne, 2007). According to Tang and Byrne 72% of academic leaders agree that blended courses held more promise than distance learning. In fact through their experiment, it is evident that students preferred the blended learning mode compared to the face-to-face mode and even distance learning. Garnham and Kaleta (2002) found that the principle reason that 80% of the students gave high level of satisfaction was the time flexibility provided by the blended mode. Time flexibility is defined as the ability to control the pace of one's learning, the convenience of scheduling coursework and a decrease in time spent in commuting. Spilka (2002) reported that through forum discussions students are required to extend their thinking much further than in face-to-face discussions. Consequently, they acquire high quality analysis and thinking resulting in more thoughtful, tactful, and sensitive reports or assignments. This experiment will attempt to explore the students and lecturers' perceptions at the different degree of blending.

In terms of content acquisition measures by the grade averages, there is no significance difference between the blended and the offline modes (Tang and Byrne, 2007). Other studies, however, reported an improvement in the learning outcomes for students (Twigg, 2003; Dziuban et al., 2005; Garnham and Kaleta, 2002), lower withdrawal rates and retention equivalent to that of face-to-face courses. Lecturers involved in blended learning reported that students wrote better papers, produced higher quality projects and were capable for more meaningful discussions on course materials (Vaughan, 2007). Aycock et al. (2002) concurred with Vaughan and suggested that this improvement is due to students being more engaged in their learning process. It is interesting to note that Sands (2002) claimed that blended courses become "de facto writing intensive courses" for the students due to the text-based nature of the online forum discussions and emails. Spilka (2002) went a step further in stating that blended learning increases the opportunities for self-directed learning and develops project and time management skills. It is not generally true for Asian students, in particular Thai students as reported by Prangpatanpon (1996). There is a lack of self-learning activities among these students because they are used to authoritarian practice, and are willing to accept what their lecturers said without questioning.

In this blended model, the Internet is used in the online mode together with the learning management system (LMS) to support teaching and learning. The Internet can improve the interaction of student-to-professor, student-to-student, student-to-material, and student-to-expert through the various Internet tools like email, bulletin boards, chats, listservs, and the Web (Wang, 2007). "Discussions are an important part of learning because they help students formulate and articulate ideas, learn the language of the subject matter, and become more comfortable with the art of discourse" (Lowry al et., 1994). Asynchronous online discussions using the bulletin/discussion board promote the development of cognitive and critical thinking skills (Wu and Hiltz, 2004) as well as facilitate student interaction with the course materials on a deeper level (Biesenbach-Lucas, 2003). Students appreciate the extra time to reflect on the course materials (Collins, 1996, 1997) and make deeper observations about questions and issues that are discussed (King, 2001). Unfortunately, according to Jones (2002) there is still some reluctance among university faculty to adopt internet technology in classroom teaching. The reasons

given are heavy workload, lack of training, caught in the dilemma as to whether to spend time on technology or research, and lukewarm support from the university administrators.

On the other hand, students are active users of internet in their daily life routine. Hence, it is imperative that internet is channelled as a useful resource to benefit students academically (Wang, 2007). Otherwise students will waste these valuable resources on non-academic activities which may distract them from their schoolwork (Matthews and Schrum, 2003). In this study, students have to serve the web in search of relevant online articles to support their discussions in the forum. Their lecturers will give them a helping hand whenever necessary.

METHODOLOGY

This experiment lasted for four weeks involving three lecturers and a total of 73 students. All the three lecturers volunteered for the experiment. They were trained on how to host online forum discussions in a workshop where they played the roles of student and lecturer. This training is necessary as the lecturers have no experience in hosting online discussions.

In addition, each of them was required to set at least one online self-assessment exercise to support their students in the online mode of learning. They had allocated one hour per week for online consultation through chat-room. The students were given the option as to see their lecturers in the faculty room or login for online chat. This option is only available in the online mode.

Each lecturer was given different degrees of blending in this experiment, that is, 25% online mode, 50% or 75% the highest online mode. For instance, in a 25% online mode students do not attend class for one week in a 4-week experiment. This arrangement is more suitable for adult students but for undergraduates we prefer to run the online and offline modes together in the same week. That is, of the 12 contact hours (three hours per week) one hour is online and two hours offline per week for the first three weeks. In this manner, the students are not completely 'lost' in the online mode. The same arrangement of mixing the two modes per week was also used in the 50% and 75% blending.

Lecturers who participated in the experiment had to submit a teaching log spelling out in detail the topics they were teaching, the online and offline learning activities, how these activities were integrated, and assignment to cover the topics taught during the experiment. These learning activities were thoroughly checked through discussions with the lecturers to ensure integration and suggestions were given for improvement before the start of the experiment. Lecturers were also required to get ready the online assessment questions (at least five questions) as well as forum topics for online discussions.

On the first day of the experiment all the students were given hands-on experience in online forum discussions. They were briefed on the dos and don'ts of forum postings and the significance of the forum in blended learning as well as the roles they played in the new learning environment. They were asked to respond to the topics posted by their lecturers immediately after the briefing. Most importantly, they were reminded to respond to each other postings and not to the lecturers' postings only.

One week into the experiment, discussions were held with the lecturers to determine any technical hitches and to overcome any problems. Postings in the forum were checked for traffic and to a certain extent the quality of the postings. In the case of relatively low traffic, steps were taken to push up the volume. Lecturers had to ensure the forum was active. Monitoring of the postings was carried out asynchronously at the time convenient to them. The lecturers must bridge or integrate the two different modes of learning, that is, online and offline by continuing the forum discussions in the class.

Lecturers carried out the normal classroom teaching in the offline mode but they must ensure this offline mode was well integrated with the online mode as it is spelled out in the teaching log. The

number of times a lecturer will meet up with the students in the class will depend on the degree of blending (25%, 50% or 75%) used in the experiment. A timetable to this effect had to be prepared before hand and distributed to the students. The importance of time management was explained to the students especially so during the online mode where they were completely 'free' on their own to plan their learning.

During online mode, students were informed to complete the assessment questions in the LMS. They were also encouraged to participate in the online discussions in order to collaborate and learn from their peers.

In the offline mode, the lecturers made use of the online discussion threads at the forum and summarized the discussions with the students in the class. The lecturers also clarified any students' doubts related to the topics.

An assignment was given to the students earlier before the experiment started as part of their coursework requirements. From the discussion forum, students were able to relate them to the assignment which was graded to determine the maturity of the students' responses in terms of in-depth discussions, wider spectrum of viewpoints and comprehension of the topics discussed.

At the end of the experiment, the students were given questionnaires to fill in the class and these feedbacks were collected back before the class was dismissed. They were told to give their honest opinions and there was no need for discussions.

The questionnaire survey consists of 15 items measuring 6 main factors, namely self study, flexibility, time management, attitude toward blended learning, forum participation and attitude toward forum discussions. The survey was distributed to 73 students who participated in the blended learning; 29 students were from the 25% degree blending learning group, 25 % were from the 50% blended learning group and 19 students were from the 75% blended learning group.

DATA ANALYSIS AND FINDINGS

The analysis on the students' perception looks into students' involvement in the activities of blended learning, how they view on the integrity of the online into offline mode of learning, and the problems as well as benefits that have from the blended learning.

STUDENTS' PERCEPTION ON THE BLENDED LEARNING

Students in general agree that one of the main benefits of blended learning is they have more flexibility in their study time. This response is particularly obvious among students in 50% and 75% blending, where a total of 56% and 52.6% of agreement were obtained respectively, as shown in Figure 1. For these groups of students, at least half of lecture time is conducted online; hence they have more flexibility selecting the best time to get online for more information. It is, however, to fully utilize this flexibility, students need a lot of self-learning process, including reading and searching internet for more information.

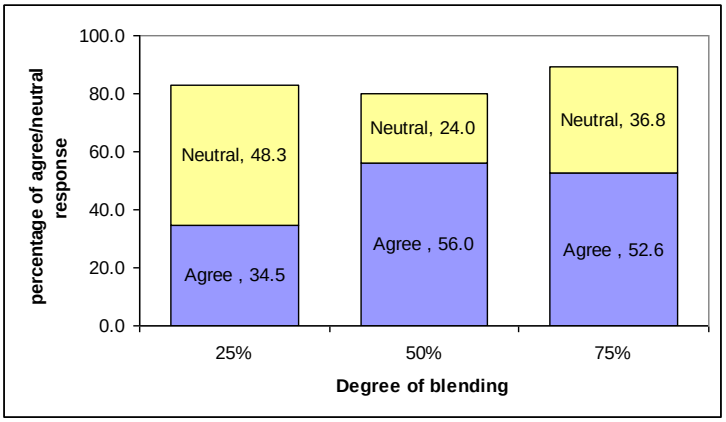
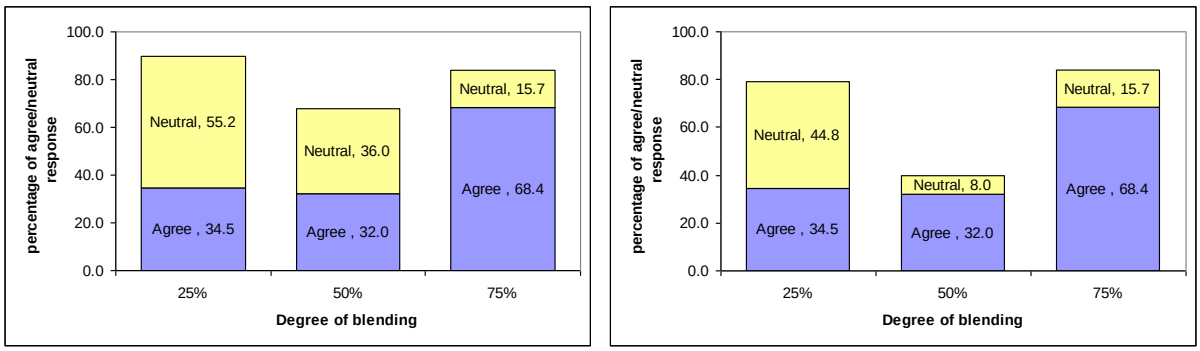


Figure 1: Percentage distribution on the students' perception on the flexibility of study time based on various degree of blending.

Notwithstanding the fact that most students agree to have more flexible time, some of them do not seem to fully utilize the flexibility given to them. The condition is particularly obvious in the 50% blending. One reason to this phenomenon is that students who are participating on the 50% blending also participated on the other experiment called transformative learning. Hence, they may be overworked, and spend relatively less time in carrying out the self study and internet resource browsing as directed. Looking on the 75% blended case, active participation from students are obtained, as more than two-third of the students have done self study and obtaining useful information from internet. One may say that it is natural for students nowadays to browse through the internet as part of their student work. This may be the case, but looking at the high degree of online mode, students are able to fully utilize the available online resources, and this is confirmed from the fact that they are doing more self study as well since the offline contact is not as much in comparison with other degrees of blending. Students who participated in the 25% blended learning also agree that blended learning has benefited them in terms of doing more self study and self learning as they spent more time on reading and learning. However, they had neutral perceptions on these items. This is perhaps 25% online mode is too low to see any impacts on the students. This perception is shared by the lecturer teaching them.



(a) (b)

Figure 2: Percentage distribution on the students' perception on the (a) performing self study as directed by lecturer, and (b) searching internet for more readings based on various degree of blending.

Students' participation in the forum discussions and how the forum is integrated is another important component in the blended learning. From the analysis of the students' responses on the online forum discussion, only the 75% blending category shows the highest percentage in the active participation in the forum. The students who participated in the 75% blending also agree that there were many postings in the online forum that trigger the further discussion on the topics and the discussions were integrated in the class during the offline mode of teaching. The other batches of students (25% and

50% blending) do not seem to enjoy the forum, and this has been confirmed by the results that the most one-third of the student enjoyed the online forum discussion across the board. The reasons for this may include the uninteresting forum topics, students are not motivated or they are overworked. This is supported by the fact that students do not have any problems in making posting in the forum (41.4% and 80.0% agreement from 25% and 50% blending students, respectively). Nevertheless, looking on the percentage of agreement, this shows another interesting fact, students who are undergoing the 50% and 75% blending seems to be more familiar with the Learning Management System.

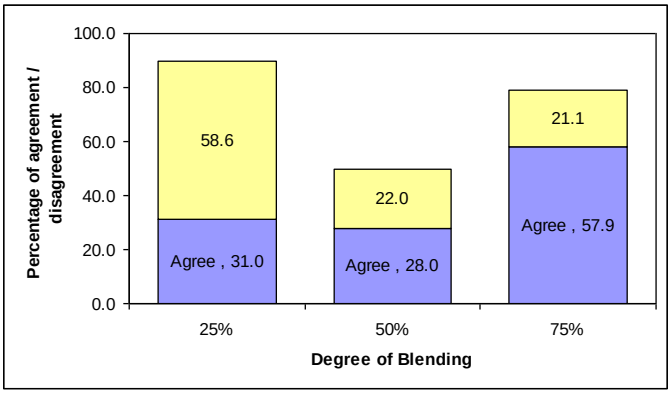


Figure 3: Percentage distribution on the how actively students participate in the online forum based on various degree of blending.

One other element in the online mode teaching is the self-assessment component, where students are asked to attempt the questions posted in the self assessment area to check their understandings of the topic. From the results the 75% blending students enjoy the online assessment, and felt this benefited them in their learning. On the other hand, 50% blending students has the least agreement on this.

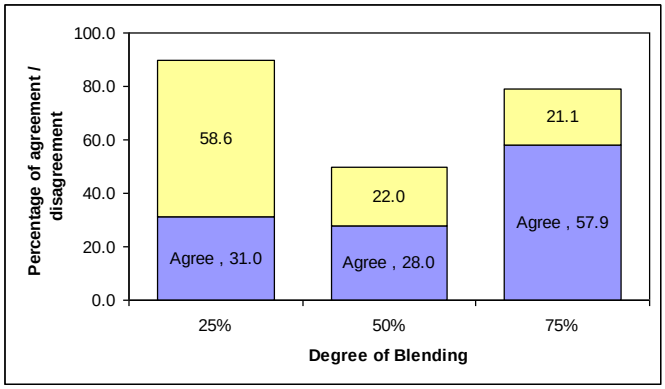


Figure 4: Percentage distribution on the how useful is the online assessment based on various degree of blending.

In addition, one of the ideas on blended learning is to trigger students to learn how to learn. This is important when one learns on his own. Here one should know how to start the process of learning without the lecturer and keep motivating himself to explore new knowledge. In this regard, 75% and 50% blending students do not have many problems on this, as only 31.6% and 28% of students respectively disagree to the fact that they have problem on study without the guidance of lecturer. The 25% blending students are relatively better in this sense that 41% of the students feel that they can handle the subject without lecturer.

To manage the study without a lecturer's full guidance, students not only should have the ability to learn how to learn but to have a good time management skills. This is particular important when the

degree of blending is high, as students meet the lecturer for the least amount of time, and most of the study process is up to students themselves. One question asked in the survey is to see if students have improved the ability on time management. Students on the higher degree of blending should show better ability on time management. The results shows the similar way, that 63.2 % of students from 75 % blending admit that they have improved time management skills, which shows that students who undergo the higher degree of blending need to manage their time better to ensure balance performance in the subject. On the other hand, students who went through the 25 % blending also agree that they have improved time management skills. The hypothesis that students of 50 % blending should stand between these extremes, but this will need to be confirmed with more analyses.

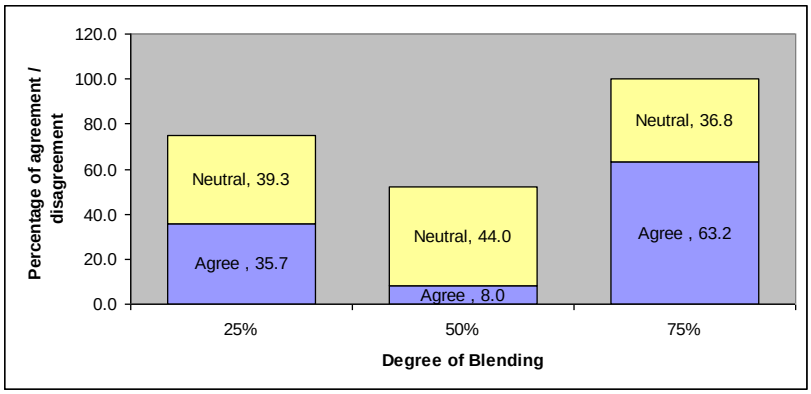


Figure 5: Percentage distribution on the improvement on time management based on various degree of blending.

Further analysis uses ANOVA to compare the differences in the students' views on blended learning. The comparisons are made between the 25%, 50% and 75% blended learning groups.

Table 1.0 ANNOVA Table

Students' views	Degree of blending	N	Mean	F-value	Sig.
Self Study	25% 50% 75%	29 25 19	3.29 2.80 3.54	6.617	0.002
Flexibility	25% 50% 75%	29 25 19	3.31 3.52 3.47	0.321	0.727
Time Management	25% 50% 75%	29 25 19	3.31 2.44 3.63	7.241	0.001
Attitude toward Blended Learning	25% 50% 75%	29 25 19	3.05 2.16 3.42	14.153	0.000
Forum Participation	25% 50% 75%	29 25 19	3.24 2.80 3.47	5.365	0.007
Attitude toward Forum Discussion	25% 50% 75%	29 25 19	3.18 3.22 3.37	0.456	0.636

Based on Table 1.0, it shows that there is a significant difference between the different groups of students' view on self study ($F = 6.617$, $p < 0.05$), time management ($F = 7.241$, $p < 0.05$), attitude toward blended learning ($F = 14.153$. $p < 05$) and forum participation ($F = 5.365$, $p < 0.05$). The results

also show that there is no difference in students' view on flexibility and attitude toward forum discussions.

A post hoc analysis using Bonferroni is carried out to determine the differences between the groups of students in their views on self study, time management, attitude toward blended learning and forum participation.

Based on results from Bonferroni, there is a significant difference between the views of 25% blended learning group with 50% blended learning group. Students from the 25% blended group believe that they have done more self study as a result of blended learning. Students from the 75% blended learning group are also different from the 50% blended learning group and reported that they have also done more self study when compared to the 50% blended learning group. There is no significant difference in the opinions on self study between the 25% and 75% group of students.

The post hoc analysis shows that there is a significant difference between students from the 25% group who reported that they have improved their time management when compared to the 50% group. There is also a significant difference between the 75% and 25% groups and the students from the 75% group have stronger view that blended learning has improved their time management when compared to the 50% group.

The results from Bonferroni show that there is a significant difference between students from both the 25% and 75% group with the 50% group in terms of their attitude toward blended learning. Similar to previous results on time management and self study, the 25% and 75% groups have more positive attitude toward blended learning in terms of participating in blended learning courses and recommending it to their friends in the future. There is no significant difference between the 25% and 75% group in terms of their attitude toward blended learning.

Forum is one of the main tools used in the blended learning teaching. The result shows that there is a significant difference between students from both the 25% and 75% group with the 50% group. The result also shows that students from the 25% and 75% groups have more positive view on forum participation when compared to the 50% group. There is no significant difference between the 25% and 75% group in terms of their view on forum participation.

DISCUSSIONS

Students agree one of the main benefits of blended learning is they have more flexibility in their study time. An important aspect of blended learning is that students should be able to learn independently and spend more time doing self study. In this experiment, students from the 75% group have positive perceptions in this aspect.

Based on the results, students from the 25% group agree that blending learning has benefited them in terms of doing more self study and self learning as they spent more time reading and learning. However, they had neutral perceptions on most items on blended learning. Probably, 25% online mode is too low to see any impacts on the students. This perception is shared by the lecturer teaching them.

When compared to the 25% group, the 50% group seems to disagree with most items in the survey. The students in general agree that blended learning allows them more flexibility in study time. However, many of them disagree with the forum activities such as the topics discussed in the forum being continued in the class. The students were also less active in online discussions. One possible explanation is that this group of students was also involved in another experiment called transformative learning. Hence, they may be over-worked.

The results of the 75% online mode seem to reveal that the students view blended learning more positively when compared to the other two groups. They agree with more items in the survey. For

example, students agree that they do more self study and learning as shown in results whereby they used internet search for reading, spent more time doing reading and learning, and agree that they have improved their time management skills. The students were active in the forum discussions.

When the three groups are cross examined there is no significant difference between the 25% group and the 75% group in terms of self study, attitude toward blended learning and forum participation. These findings will be further studied to determine whether they are suitable lower and upper boundaries for effective implementation of blended learning.

CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

Based on the results, it shows that blended learning do bring benefits to students. Overall, the blended learning experiment shows that students do view the new teaching method in a positive manner as many of them on average reported improvement in self study and time management skills.

Whether different degrees of blending benefit students differently, this pilot study tends to show that there is no significant difference between the 25% and 75% groups in self study, attitude toward blended learning and forum participation. More studies are needed to re-affirm the findings and also to set the relationship between the 50% group with the rest. Currently, this experiment is replicated in Malaysia and Pakistan under a longer duration of 8 weeks.

As the 50% group also participated in another experiment their data may interfere with the findings of the research and hence contributed to the study limitation.

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Appendix

Blended Learning Experiment

Student Questionnaire

Faculty: ……..

Thank you for your participation in the blended learning experiment. Your contributions will go a long way in improving the quality of teaching and learning at INTI-UC.

Please give us your opinions to the items listed below. There is no right or wrong answer just your honest view.

Please tick one option.

SA – strongly agree A – agree N – neutral D – disagree SD – strongly disagree

Item	SA	A	N	D	SD
1. I participated actively in online forum discussions.					
2. I carried out self-reading as recommended by my lecturer.					
3. There were many postings in the forum.					
4. I searched the Internet for online articles to read.					
5. Forum discussions were continued in the classroom.					
6. I did not know how to post my responses to the forum.					
7. I enjoyed online forum discussions with my friends.					
Item	**SA**	**A**	**N**	**D**	**SD**
8. Self-assessment questions are useful aid in understanding the lesson taught.					
9. I used the chat-room for online consultations.					
10. Flexibility of when and where to study is great.					
11. I spent more time learning and reading.					
12. Blended learning helps to improve my time management skills.					
13. I do not know how to study without my lecturer in the classroom.					

14. I will recommend blended learning to my friends.					
15. I will consider taking a course taught in blended mode in a coming semester.					

16. How often do you participate in online forum discussions?

- Once per week ☐
- Twice per week ☐
- Three times per week ☐
- At least four times per week ☐

17. Choose the degree of blending you prefer (tick one option only):

- 25% online mode ☐
- 50% online mode ☐
- 75% online mode ☐

18. Other comments: ……..

……...

……

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Identification of Learning Barriers Affecting English Reading Comprehension Instruction, as Perceived by ESL Undergraduates in Thailand

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ABSTRACT

Facility in English language reading comprehension is essential for learners of English as a second language, since English is the international language of written (as well as spoken) communication for business, science and technology. In Thailand, as acknowledged in the literature, learners of English as a second language often experience considerable difficulties with reading. There are many reasons for this, but, given the importance of reading to the development of language proficiency, it is of great importance to identify ways in which student learning can be enhanced. This paper reports on a project that sought to obtain specific information from Thai undergraduate students about their experiences when undertaking formal reading classes in a higher education institution. The study was part of a larger project to identify ways in which student learning could be enhanced. It involved the application of focus group techniques to elicit information about students' experience of the reading classroom in Thailand. The findings indicated that while students appeared to be motivated to develop their English language reading comprehension, they experienced barriers to learning which included an educational approach which did not foster independence and autonomy; materials that were not always engaging; and a classroom environment which was not optimally conducive to learning.

Keywords: Reading comprehension, English language

INTRODUCTION

Reading comprehension can be described as the interpretation and evaluation of a written text in order to ascertain the message of the writer (Bond et al, 1989); and facility in it has long been recognised as an essential skill which second language learners need to acquire if they are to attain mastery of the language that they are learning. The construct of reading comprehension is, however, a complex phenomenon which involves psycholinguistic factors which relate to schemata and text processing (Grabe & Stoller, 2002); linguistic and sociolinguistic factors, which also include an understanding of pragmatics and discourse organisation; and a knowledge of a particular range of reading strategies (Koda, 2004) including the active utilisation of background knowledge (Westwood, 2003).

Comprehension is achieved by the bottom up approaches of decoding at word, phrase and sentence level as well as the top down approaches of predicting content and drawing on existing schemata to create meaning (Anderson, 2003). As issues connected with any one of these factors can impact on a student's facility in reading comprehension, it is important that they should all be addressed in the reading classroom. The study described below therefore sought to elicit data to discover the extent to which this appeared to be taking place.

Numerous studies, including those from Thailand (e.g. Intratat, 2004; Piromruen, 1993; Suknantapong, Karnchanathat & Kannaovakun, 2002), have indicated that attaining facility in second

language reading comprehension can be a problematic process and that many learners experience considerable difficulties in developing their expertise in reading. The reasons for this are numerous and include issues with first language reading ability, low level decoding skills, lack of cultural knowledge of the material, lack of motivation to learn, lack of diversity in teaching materials, over-dependence on the teacher and a concomitant lack of learner autonomy, lack of opportunities to read and inadequate exposure to reading materials. Classroom pedagogies can also impact on reading comprehension (Nuttall, 2005). Having identified the issues as presented in the literature, the study described in this paper sought to identify which, if any, of them might apply in the context of the Thai university being investigated.

It follows from the above that activities which will encourage students to develop their full reading potential will involve the facilitation of both intrinsic and extrinsic motivation, the development of learner autonomy and engaging forms of instruction. Intrinsic motivation has been described as the sense of satisfaction which learners obtain from their performance and extrinsic motivation as factors which encourage participation in the classroom (Deci et al, 1991). Autonomous learning, also known as self-directed or independent learning (Ciekanski, 2007:112), can be described as the capacity of learners to manage and self-monitor their learning processes (Abdullah, 2001). Given the range of factors described above which can impact on the development of student reading proficiency, it is of great importance to identify specific ways in which student learning can be enhanced.

THE STUDY

The study was a preliminary investigation intended to inform the production of a subsequent survey instrument to be administered to a large cohort of participants to address this issue of how student learning in reading instruction classes in Thailand could be enhanced. The preliminary investigation described in this paper took the form of a group interview or focus group conducted with nine learners from four different English language classes at one Thai university. The participants were broadly similar in terms of their English language levels, educational experience and age since 'groups that are relatively homogenous are more productive and "work better"' (Stewart, Shamdasani & Rook, 2007: 10). They were also drawn from the population to which the final survey instrument would be administered. The focus group interview was deliberately selected because of its particular properties of entailing communal discussion. It was believed that the interaction of the members of the group would generate a depth of data through the synergies of the group that would not necessarily be elicited in individual interviews; the data which emerged would then be used to assist in the development of the main survey instrument to follow. A discussion guide, comprising a total of thirteen open ended questions, had been prepared prior to the session, with the intention of eliciting information about students' attitudes to reading as an activity in both Thai and English, their views of and frequency of reading outside the classroom environment, their experience of English reading textbooks used in their classes, and the issues they had personally experienced with regard to reading in English, their learning environments and their English instruction.

The process was facilitated by the researcher, whose goal was to ensure that the group encouraged participants 'to share perceptions and points of view, without pressuring participants to vote or reach consensus' (Krueger & Casey, 2000: 5). Participants were made to feel at ease through an icebreaking activity and the provision of refreshments, and assured that confidentiality would be maintained and their anonymity guaranteed in reports. The session was recorded in two ways, as recommended by Bertrand, Brown & Ward (1992), to ensure completeness of the data obtained: through a reporter, who took notes but did not participate in the study, and, after obtaining permission for its use from the participants, through a sound recording device. The presence of the note-taker permitted the recording of paralinguistic features such as body language and provided a source of triangulation for the researcher's impressions of the direction of the discussion, thus 'supplementing the oral text and enabling a fuller analysis of the data' (Rabiee, 2004: 656). To achieve this, the researcher and note-taker engaged in a debriefing session immediately following the focus group session, as recommended by Krueger and Casey (2000). The researcher transcribed the interviews, which were held in Thai and

subsequently translated into English. In order to minimise researcher bias and to ensure the greatest accuracy of the translation, a second translator with expertise in the teaching of English to Thai students was also subsequently used.

While precautions were taken to reduce the impact of the researcher on the data, it is nevertheless acknowledged that it is a characteristic of qualitative research of this type that it involves the co-construction of the data by both the researcher and the participants (Corbin & Strauss, 1990), and that any kind of research that is based on spoken genres means that 'utterances are always preceded by and followed by other utterances that help constitute the meaning of the utterance in focus' (Melles, 2005: 24). There is, therefore, subjectivity involved in the development of the interaction and the linguistic output, as well as in the subsequent analysis. For this reason, 'confirmability', to use the term adopted by Lincoln and Guba (1985) in their seminal work on qualitative research, is an essential component of the qualitative approach. For this study steps were taken to establish confirmability within the focus group through the use of both oral and written recordings of proceedings, through the presence of both the researcher and note-taker in the actual session, both of whom contributed to the data to be analysed, through the use of two translators of the recorded data from Thai to English, through the contribution of a second researcher at the data analysis stage, and through the use of rigorous data analysis processes.

The questions presented to the participants moved through the following stages: (a) general questions about participants' general reading habits, asked in order to elicit data on intrinsic motivation to read; (b) questions about the participants' English language classes, including those related to pedagogy, tasks, materials and environment, asked to elicit data about participants' classroom experience; (c) questions about any difficulties experienced by participants in their classes, asked to elicit data about possible barriers to learning; (d) a final question about how reading classes could be improved, asked to elicit data that would inform the next stage of the research.

The data analysis process followed the steps identified by de Wet & Erasmus (2005): a close reading of the data, a summarising coding process, the identification of 'clusters and hierarchies of information' (de Wet & Erasmus, 2005: 33), and the identification of relationships, patterns and explanations. The first stage involved an unusually intensive engagement with the data, because the main researcher not only transcribed the recording but acted as one of the translators of the material from Thai into English. This involved close examination of each word, phrase and sentence to best capture in translation language which it was believed represented the intended meaning of each speaker. From this detailed reading (involving the transcripts in both languages) the first preliminary ideas emerged.

The second stage involved separating out the data and reducing it into categories. For this step two different approaches were used: a colour-coding process conducted on an intact transcript, and an electronic version of the standard 'cut and paste' technique, in which phrases, sentences or paragraphs were organised into groups according to theme, a process which was continued until the entire text had been exhausted. Using this procedure, the data were organised primarily into a set of descriptive contrasting dyads which reflected the positive and negative comments participants had made about reading in general, reading in English and reading in the classroom. At the third stage, the data within each of the categories were summarised and grouped according to the overarching issues that had been identified, so that the process of explaining the data could begin.

FINDINGS

The initial questions had sought to establish whether these particular students were intrinsically motivated to read at all, and if so, what kinds of texts they found most appealing. In a world in which young people have instant access to multiple forms of information through a range of media, it was considered possible that reading per se might not be seen as an appealing exercise. However, there was a general consensus in the group that reading was an enjoyable activity, with only one participant

expressing any reservations. Group members were, it appeared, intrinsically motivated to read. Specifically, enjoyment was gained from the topic if it was related to the reader's own interests.

Travel, health, sport, beauty tips and general knowledge were identified as particular topics of interest; politics, on the contrary, was considered one to avoid. In addition, enjoyment came from the capacity of reading material to draw the reader into a new world or to induce the trance like state identified by Nell (1988) – as participant 4 commented: "เหมือนกับเราได้เปิดโลกเหมือนเขาแนะนำพาเราไปท่องเที่ยวด้วยนะครับ" [it seems like I travel with the author when I read it] - and from the capacity of reading texts to develop the reader's imagination. Novels such as the Harry Potter series and Lord of the Rings were described as examples of the kind of literature that was appealing.

When it came to reading in English, all those participants who commented indicated that they were also intrinsically highly motivated to read for enjoyment, the word 'fun' being used by many of the participants. Husman & Lens (1999) suggest that there are two dimensions for motivation: intrinsic and extrinsic goals, and immediate versus future goals. Among the group members involved in the focus group study, in addition to the immediate pleasure gained from reading, there seemed among some of the participants to be a sense of future oriented motivation. Most were aware of the value to their everyday lives of having strongly developed English skills, to which reading would contribute; one mentioning that English was the language of computers and another that English was the language of instructions in mobile phones. One participant made a direct connection between English and her future career goal, which was "to be an ambassador" (participant 3).

The ability to communicate in English was valued by participants particularly as they were able to experience it in their daily lives as an immediate need. For example, participant 2 was concerned that "we might be asked for directions by foreign visitors", and participants 2 and 9 commented on the need to be able to understand song lyrics. The connection between reading and the development of English language proficiency more generally was one which was frequently observed, and appeared to be a factor that motivated their desire to read. In particular, four of the participants made reference to reading as a source of new vocabulary which could then be applied in daily life, and three to the availability of texts which were written dialogues that could authentically be used in actual situations, particularly in conversation with foreigners. One participant (participant 9) referred to his friends and family members as being "hua muang nok" – which can loosely be translated as fanatical about 'Western' culture. As the participant was an English major he was often approached to provide translations of cartoons and song lyrics.

In fact, encouragement of the participants by family and friends, whether implicit or overt, appeared to play a role in promoting learning. One participant's parents, for example, bought her English language newspapers; the same participant watched the television news on an English language channel in Thailand. Another participant watched films with English soundtracks with an aunt and uncle. When questioned about how they addressed the difficulties they experienced with reading in English, several participants responded that they asked their parents or friends. One participant had foreign friends who were consulted because they were also able to speak some Thai. Nevertheless, in spite of the availability of this support, on the whole the participants did not engage in much deliberate reading in English outside the classroom for its own sake; where they were exposed to English language texts it tended to be incidental or instrumental, for example through advertising billboards, cell phone instructions and computer software.

The classroom experience of the participants was another key area explored in the focus group, generating comments on both pedagogy and the experience of learning English through reading. A recurring comment was that participants felt discouraged when confronted by texts which contained too much vocabulary that was unfamiliar or had not been internalised, even if it had been previously presented to them in their classes. Additionally, as participant 7 pointed out: sometime words have

'one meaning in one context and have a different meaning in another context'. Idioms, too, caused difficulties, particularly when they could not be directly translated. Other comments seemed to indicate that some of the texts used in the classroom did not align with students' schemata: one participant complained about what appeared to be an inexplicable and incomprehensible use of abbreviations, and another about the use of italic script for emphasis rather than a bold typeface. The absence of a familiar schema can act as a barrier to comprehension (Carrell, 1987; Irwin 1991) and should therefore be an important consideration when classroom texts are selected.

The participants' comments may also have been an indirect comment on the pedagogical approaches used in the classroom. First, it might indicate that students were being presented with material that was set at a level too high for their capabilities. The concept of 'comprehensible input' (Krashen, 1981), which argues that optimal input for language learners should consist of content that is just beyond the learner's current level, has been broadly accepted by language teaching professionals as a valid approach for over twenty-five years. Second, it seemed from these and subsequent comments that students had not been made aware of any strategies they could use to address their difficulties with vocabulary, other than those which least promoted self sufficiency and autonomy: most who offered an opinion commented that they used their dictionaries or asked those around them in order to find out the meaning. Only one suggested that by continuing to read beyond an unknown word the meaning of that word might become clear.

Participants' attitudes towards particular texts were also influenced by the format and genre in which they were presented. Illustrated texts and cartoons were identified for particular comment, because they were, as participant 1 put it, "fun and relaxing". This was not an unexpected finding, given the importance of visual presentation in much of the media available today. Participants were not motivated to read materials that comprised dense text, were not illustrated, or were not in colour. As participant 5 commented: "it is boring to read the textbook that is black and white and has no illustrations. If the book had some illustrated pictures and was colourful, I would feel like I was reading a magazine. It would be more attractive to study". Such a viewpoint was reiterated by others at various stages of the focus group interview and appeared to be a key source of dissatisfaction, when it was expressed, with some of the instructional materials they were issued. This also extended to the types of font used, some of which appeared to be difficult to read. The use of italics came in for particular criticism, bold or highlighted text being a preferred way of indicating emphasis. At the same time, there was some diversity of opinion. Participant 1, for example, stated: "the book used in my class is quite good. There are some illustrated pictures which help me capture the main idea". This, along with other, similar, comments, indicated that the types of materials used varied between classes, even though there was a set textbook.

One aspect of the participants' commentary on the materials they used was their selection of expressions to describe what they did with the texts. The participants' choice of verbs of obligation reinforced the fact that the materials were imposed on them and implied a lack of engagement or ownership of the process. For example, comments included: "we read in groups... everyone **had to** read it" (participant 5); "the teacher usually **assigned** us to read the news, and then we **had to** present and summarise..." (participant 6); "you **had to** answer the questions about what was going on in the text" (participant 1).

As might be expected in any language teaching institution, the activities used in the reading classes varied and some teachers appeared to manage their classes and hold their students' interest more effectively than others. Tasks included reading in groups, reading to the class, summarising texts, conducting role plays (particularly where the texts were written transcripts of oral interaction), and playing games. Computer assisted language learning (CALL) did not play a part in the classes of any of the participants; something, according to their comments, which they would have found beneficial. This omission is surprising, given the Thai Government's promotion of technology in education (Office of the National Education Commission, 2003), the ubiquity of computers as an educational tool, and the growing body of literature that identifies CALL as a promoting positive attitudes to

language learning (e.g. Levy, 1997; Liu, Moore, Graham & Lee, 2002). With the exception of their identification of this particular educational aid, however, when they were asked to identify ways in which their classroom reading experience might be improved participants did not focus primarily on the kinds of activities they would like to undertake, but on the teachers and teaching approaches (e.g. the desire to have a single teacher over an extended period of time, the desirability of having only English spoken in the classrooms, the benefits of having 'native speakers' of English as teachers) and on the materials.

With regard to classroom management, one particular issue identified was the disruption caused by students who were inattentive and talked among themselves. In Thai classes there can be as many as 50 students, so for some of the participants disruption was a major source of disquiet simply because of the noise generated – one participant even stated: "my friends are very noisy in class. They psychologically harass me" (participant 9). The same participant went on to describe her experience of studying as "miserable" because of the clamour made by her classmates. The experience was not universally shared, however, as some participants observed. In general, the quality of the experience in this regard appeared to depend on the ability of the teacher to manage the learning environment, as most participants related the noise levels, either directly or indirectly, to the teacher's level of control.

DISCUSSION AND CONCLUSION

This focus group study was held in order to yield data that would inform the development of a subsequent survey instrument. It was hoped that the results would assist in the identification of particular areas of concern to the students themselves so that the subsequent instrument could investigate in more detail the reasons why Thai students do not in general attain high level reading skills even if they have a positive attitude and a high motivation to study (Suknantapong, Karnchanathat & Kannaovakun, 2002).

The results seem to support the findings in other studies in Thailand that students experience difficulties in reading because they have not developed reading skills such as using context clues or locating main ideas (Sroinam, 2005) and that they have problems decoding words. Of course, at the same time, readers who are able to recognise the meaning of words automatically are more able to develop their reading comprehension than those who spend longer seeking to define words from contextual or other clues in the text (Westwood, 2003). This is because, in relative terms, readers who spend time on defining words may lose concentration while reading, and therefore not retain the key points from the texts they read (Irwin, 1991).

The study also indicated that a factor which might relate to students' difficulties in reading is the lack of encouragement of autonomous learning. The members of the focus group mainly depended on teachers, parents, friends and dictionaries to solve their reading issues; they did not seem to have been armed with strategies that would make them more self-reliant, or to have been presented with materials or choices in the classroom that might assist in developing an intrinsic desire to read. This is a pre-requisite to the successful development of high level skills. Studies conducted on Chinese students strongly link motivation and success in the classroom; with highly motivated students showing a greater level of confidence, interest in participating in reading activities and willingness to make a greater effort to comprehend texts (Gan, Humphreys & Hamp-Lyons, 2004; Lau & Chan, 2003).

Central to developing that motivation appeared to be the educational environment in which students were expected to study and the materials with which they were presented. Visually unappealing materials, such as those with extended texts and an absence of illustrations and colour, did not sufficiently engage the participants and encourage them to study; this, compounded with distractions in the classroom such as excessive noise, was a source of some considerable dissatisfaction for the members of the focus group.

In conclusion, the research confirmed the findings of other studies conducted in Thailand: that for many students the classroom was not in general a place in which conditions for learning were optimised. The participants' intrinsic enjoyment of reading and their motivation to learn, which they seemed from their input to possess in abundance, were not being utilised as tools to promote their second language reading capabilities in the classroom. On the contrary, many of the participants had experienced formal reading instruction in a way which reinforced barriers to learning in the many ways which have been previously identified. It was clear that for this particular group of students, at least, in some cases new approaches to learning needed to be brought into their classrooms; it will be the next stage of this study to investigate which approaches are most likely to be successful in the context of undergraduate English language education in Thailand.

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Item Banking With Rasch Measurement: an Example for Primary Mathematics in Thailand

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ABSTRACT

This study was conducted in Thailand to create a Mathematics item bank and a Computerized Adaptive Test (CAT) for the students to 'interrogate' the bank. First, 290 multiple-choice test items on mathematical equations were created for an item bank. They consisted of nine aspects: (1) identifying an equation; (2) identifying the true equation; (3) identifying equations with an unknown; (4) finding the value of an unknown that satisfies the equation; (5) identifying a method to solve an equation; (6) finding the solutions to equations; (7) finding a solution to an equation related to a given condition; (8) selecting an equation converted from a verbal problem or a verbal problem related to an equation; and (9) solving an equation problem. Seven papers with 50 items each, containing 40 different items and 10 common items, were administered to 3,062 students of Year 6 (Prathom Suksa 6). There were 409, 413, 412, 400, 410, 408, and 610 students taking part in the 1st to the 7th tests respectively. The data were analysed with the Rasch Unidimensional Measurement Model (RUMM 2010) computer program so that all the item difficulties were linked on the same linear scale along with the student measures of mathematical ability. Ninety-eight test items fitted the measurement model and were installed in the item bank. A computer program for CAT was created, tested, and modified after trialling. A controlled experiment involving the use of CAT with 400 Prathom Suksa 6 students from two primary schools in Ubon Ratchathani province, Thailand, was implemented. Thai students were very supportive of the use of CAT with the mathematical item bank. They showed an interest in CAT and in extending the use of CAT to other subject areas with appropriately developed item banks.

INTRODUCTION

Item banks are potentially very helpful for teachers and test developers and they make test-taking easier, faster and more efficient. In the United States, for example, the concept of item banking has been associated with the movements to both individualized instruction and behavioural objectives in the 1960s (Hambleton, 1986; Umar, 1999). Van der Linden (1986, cited in Umar, 1999) viewed item banking as a new practice in test development, as a product of the introduction of Rasch measurement (Rasch, 1960/1980) and the extensive use of computers in modern society. It was suggested that, when a large collection of good items is available to either teachers or test developers, much of the burden of test construction can be removed. The quality of tests used in the schools, for example, could be expected to be better than it would be without an item bank. When a calibrated item bank is developed with Rasch measurement, testing programs can be made more flexible and appropriate, because different groups of students can take different tests which are suitable to each of them and the results can still be compared on the same scale.

What is an Item Bank?

Generally, the words item banks and item pools are used interchangeably in the research literature. Scholars generally identify the term, Item Bank, as a large collection of good test items for which their quality is analysed and known, and which are systematically stored in a computer so that they are accessible to students for measuring their achievement or ability (Choppin, 1981, 1985; Department of Academics, 1991; Millman and Arter, 1984, pp.315-316; Paeratkool, 1975; Rudner, 1998a, 1998b; Wibroonsri, 2005). The items can be stored and retrieved by different aspects, such as subject area, instructional objective measurement, measurement traits, with their accompanying significant item statistics such as item difficulty and discriminating power. Item banks are intended to ease the search and application of various testing procedures in addition to serving the users' needs (Department of Academics, 1991, p.4; Gronlund, 1998, p.130).

Some scholars state that item collection is not only a 'warehouse' or 'storage house' of items but, in a proper item bank, the items are systematically organized through the processes from the start. In a proper item bank, each of the items is codified and classified by subject matter assessed, objectives, and the psychometric traits of the items. The well-selected items are normally stored in the memory unit of the computer so that they can be later easily used when needed (Ebel and Frisbie, 1986, p.927). Ideally, the advancement of item banking could be achieved in that the statistical processes will be applied to differentiate and aggregate the items with the same difficulty level. This contributes to the possibility of the assessment comparison, although the results are gained from different test items (Shoemaker, 1976 cited in Lila, 1996, p.36; Wright and Bell, 1984, p.331).

In a Rasch item bank, each test item is statistically calibrated to be linked on the same interval level scale. This can be easily processed with a specially developed computer program (such as RUMM, Andrich, Sheridan & Luo, 2003) which shows each item of the test that fits the measurement model. The test is flexible, appropriate to Rasch measurement and its implementation, and it is applicable for school use. This has been explained by van der Linden (1986 cited in Umar, 1999, p.209) who viewed item banking as a new practice in test development, as a product of the introduction of Rasch measurement and the extensive use of computers in modern society. The items which cover every aspect of the domains are categorised and stored into the same domain of knowledge or ability. They are also located on a common, linear scale. In the selection of the items for testing, using Computerized Adaptive Testing, a certain statistical value namely difficulty is considered to be appropriate for the ability or competence level of the student. The result of the test even though different items are used can be compared since each of the test items is on a common, calculated linear scale. An item bank at this level could be considered as a model of a 'measurement system'. In this system, any new items intended for measuring the same attribute could be validated and calibrated onto the existing scale of the bank. Since the items are calibrated, it is possible to compare results from tests consisting of different subsets of items from the bank (Hambleton, Sawaminathan, and Rogers, 1991). As such, a calibrated item bank when developed with Rasch measurement makes the testing programs flexible and appropriate, because different groups of students can take different items which are suitable to each of them and the results can still be compared on the same scale. Together with sophisticated computer software, application of Computerized Adaptive Testing could be made possible at the school or district level (Hambleton et al., 1991).

Potential Benefits of Item Banking

It is believed that item banking can potentially bring many advantages to educational assessment. The students could directly benefit from such an evaluation tool since the well-developed test items can potentially accurately measure and compare their true competence or achievement level. There are ten potential benefits of item banking gleaned from the literature.

(1) Teachers can select good test items which meet the measurement objectives and the content from the item bank to suit their students' abilities in each of the area of testing.

(2) Item banking can reduce time spent on the construction of the test items by teachers. This could result in teachers having more time available for the students and their teaching tasks (Umar, 1990).

(3) The items analysed using Rasch measurement will help create a test which contains items located on a common, linear scale and based on a variety of options or objectives (Rudner, 1998a) which in turn contribute to the comparison of the test results of the students who take the different test items, since the Rasch model used will assure items from multiple tests can be placed on a common scale and indicate the relative difficulty of the items (Rudner, 1998a).

(4) Item banking will enable teachers to build a test which contains items located on a common, linear scale and based on a variety of options or objectives by using a Rasch measurement model which is highly effective in item analysis and unidimensionality assessment (Njiru and Romanoski, 2007a, pp.3-4; Rudner, 1998a,b).

(5) Item banking displays the advancement and standards in a school's measurement of student achievement; that is, valid longitudinal achievement inferences can be made from it.

(6) Teachers and measurement experts will be able to easily improve the item bank either by increasing or improving the test items to update them and make them relevant to the changing curriculum, as is required by State Systems, schools and the public at school and national levels (Njiru and Romanoski, 2007a, pp.3-4).

(7) A well-developed item bank enhances effective measurements because the test items can be improved in both validity and reliability to meet educational higher standards (Umar, 1990). This consequently assures the accuracy and reliability of the measurement.

(8) Security is guaranteed because there are a lot of items in the bank. It is unlikely that the students who take the test can remember all of the items from one or several testings. Item banks can therefore protect item leakage, at least to a large extent (Choppin,1981 cited in Millman and Arter, 1984; Umar, 1999, p.210).

(9) Item banking is a product of a new innovation in measurement, namely Rasch measurement coupled with improvements in computing power (Computerized Adaptive Testing), and is easily applied to school state and national educational assessment; each student can complete different test items but the results from the testing can be compared (Umar, 1999).

(10) Item banking potentially allows for the creation of a test which is adaptive to any group of students who have different learning abilities and for students with disabilities (Umar, 1990).

Item Banking in Thailand

In the case of Thailand, the concept of item banking apparently emerged in 1957 and was widely known in 1982-1984 when Thailand was assigned by her neighbouring ASEAN countries to initiate a testing program for the entire ASEAN education region, but its use in any Asian country is still very limited, probably because of the large cost involved in development (Boonprasert, 1988). Throughout the 1982-1984 project, there were several training seminars and further educational seminars, including the proceedings for the meetings. Since then, the Thai Ministry of Education has been very slowly developing item banking with a view to eventually expanding it to the regional and local levels (Department of Academics, 1991, p.5). At the Provincial level, for example, the Item Banking and Examination Online System Chiang Mai Examination Centre was established in Chiang Mai Province in 2007 (Sangphueng and Chooprateep, 2007). The Project of Item Banking Development of Nong Khai Superintendents was established in 1997 (Srisamran, 1997), but these have not been developed to

the stage where they can be used by teachers and students in schools on a continual basis. They are still in the developing and trialling stage.

On Thai university campuses, there has been some limited research of item banking such as the Online Test Bank at Sura Nari University of Technology (Chansilp, 2006). The test items in this university were standardized on the basis of Traditional Measurement Theory which can only produce non-linear scores and so it is difficult to see how this item bank project can be useful and it would have been better if the researchers had used Item Response Measurement Theory to create linear measures. Other item bank projects in Thai universities have used Item Response Measurement, but they have used the now discredited so-called 2-parameter model (actually involving three parameters, item difficulty, item discrimination and one parameter of person ability) or the so-called 3-parameter model (actually involving four parameters, item difficulty, item discrimination, a guessing parameter and one parameter of person ability) (see Wright, 1999a for a discussion and discrediting of these models). The best Rasch model to use is the so-called 1-parameter model (actually one parameter of item difficulty and one parameter of person ability) (see Andrich, 1988a, 1988b; Wright, 1999a,b). In Thailand, the 2-parameter and 3-parameter models were used by research students to develop trials of item banks for Mathematics (Maneelek, 1997; Songsang, 2004; Supeesut, 1998, 1999; Tuntavanitch, 2006), English (Phungkham, 1988), and Chemistry (Suwannoi, 1989).

COMPUTERIZED ADAPTIVE TESTING (CAT)

CAT consists of a computer program that allows a student to 'interrogate' an item bank (Embreston and Reise, 2000; Weiss, 2004, 19833,1982). The test items are constructed and adapted to the ability level of the individual test-taker and administered using a computer (Beevers, McGuire, Stirling, and Wild, 1995; Lord, 1971, 1980; Nering, 1996; Shermis et al., 1996; Stocking and Swanson, 1998, p.271; Wainer, 1990, 1993; Weiss, 2004, 1983). Examinees do not have to answer exactly the same test items as any other examinees and the number of test items to be answered by different examinees are not equal, they depend on the result of the test items that an examinee chooses to answer (Karnjanawasri, 2002; Lord, 1980; Weiss, 1983; Weiss, 2004).

RASCH ANALYSIS FOR THE ITEM BANK (PRESENT STUDY)

The present study involved an initial analysis with 250 mathematics items involving six tests with 50 items each. For linking the scales, each test contained 10 common items first, and then the six data sets were combined. Responses for the mathematics tests came from 2,452 Prathom Suksa 6 (Grade 6) students in Thailand which were entered into an Excel file, as per the response category codes (zero for wrong and one for right) and then converted to a text file. The data pattern had 254 columns: columns 1-4 were for the ID; columns 5-14 were for 10 answers of common test items; columns 15-54 were for 40 answers of test 1; columns 55-94 were for 40 answers of test 2; columns 95-130 were for 40 answers of test 3; columns 135-174 were for 40 answers of test 4; columns 175-214 were for 40 answers of test 5; and columns 215-254 were for 40 answers of test 6. The data were analysed using the Rasch Unidimensional Measurement Model (RUMM2010, Andrich, Sheridan & Luo, 2003) computer program. The non-performing items of the mathematics test (172 items out of 250) were deleted from the scale, leaving 78 items that fitted the measurement model.

Because 172 items (out of 250) were deleted, as not fitting a Rasch measurement model, only 78 items were stored in the item bank and to improve the bank, a further 50 items were created and analysed. For linking the scales, 10 common items from the 78 set were added to the 50 set for calibration together. Data from 610 students were analysed using the RUMM computer program. Of these 50 items, 30 were deleted as not fitting a Rasch measurement model, leaving 20 good fitting items to be add to the set of 78 items.

In Rasch analysis, the items are designed in a conceptual order by difficulty and this order is tested. The data for the items have to also fit the measurement model in order to create a linear scale and this

is tested. The person measures and item difficulties were calibrated on the same scale by the RUMM 2010 program, thus providing the creation of a linear measure of achievement for primary school equations in standard units called logits (log odds of answering positively) (see Figure 1). In Figure 1, the student achievement measures are from low to high on the left hand side and the item difficulties are from easy to hard on the right hand side of the same linear scale.

Rasch Analysis: 78 Item Scale

The final analysis with the RUMM program tested the 78 items (N=2,452) in order to create a linear scale of mathematics achievement from an initial bank of 250 items. The residuals were examined; the residuals being the difference between the expected item score calculated according to the Rasch measurement model and the actual item score of the students. This was converted to a standardized residual score in the computer program. The global item fit residuals and global student fit residuals have a mean near zero and a standard deviation near one, when the data fit the measurement model. In this case, the global item and person fit residuals indicate a satisfactory, but not excellent, fit to the measurement model (see Table 1). The individual probability of fit of items to the measurement model was then checked. Of the 78 items, 71 fitted the measurement model with probability $p>0.04$.

Item Trait Test-of-Fit

The item-trait test of fit examines the consistency of the item difficulties across the student mathematics measures along the scale. This determines whether there was agreement amongst the students as to the difficulties of all items along the scale. The item-trait interaction was not statistically significant at the 0.01 level [Chi-square (df =690) =760.34, p =0.03]. This means that a dominant trait was measured and that overall fit to the measurement is acceptable, but not excellent.

Table 1

Summary of fit statistics for mathematics achievement scale (78 items)

	Items	Students
Number	78	2,452
Location mean	0.00	0.58
Standard deviation	0.62	1.64
Fit statistic mean	0.63	0.08
Fit statistic standard deviation	1.23	0.73
Item-trait interaction chi square = 760.34, df=690, p=0.03		
Person Separation Index =0.83		
Power of test-of fit: Good (based on the Separation Index)		

Notes on Table 1

1. The item means are constrained to zero by the measurement model.
2. When the data fit the model, the fit statistics approximate a distribution with a mean near zero and a standard deviation near one. The item fit and student fit are satisfactory, but neither is an excellent fit.
3. The item-trait interaction indicates the agreement displayed with all the items across all students from different locations on the scale (acceptable for these data). This means that a dominant trait has been measured.
4. The Student Separation Index is the proportion of observed mathematics variance considered true (in this scale, 83% and is acceptable). It tells us that the measures are well separated compared to the errors.
5. Numbers are given to two decimal places because the errors are between 0.11 and 0.14

Targeting

The item difficulties range from –1.3 logits (SE=0.12) to + 1.6 logits (SE=0.14) and the student measures range from –3.4 logits to +4.2 logits. There are some students (34%) whose mathematics abilities are more than +1.6 logits and less than –1.3 logits and hence not 'matched' against an item location on the scale. In Figure 1, there are no items matching persons at either the lowest end (-1.5 to –3.5 logits) or the highest end (+1.5 to +4.4 logits) of the scale, indicating the improvements that are needed for the test. That is, both easy items and hard items need to be added to improve the targeting of the items for these Prathom Suksa 6 students. There are approximately 600 students who found these test items easy and approximately 180 who found who found them hard. The item difficulties were appropriate for the rest of the students, approximately 1,770 students.

```
------------------------------------------------------------------------------
Location          Persons                Item Difficulties
------------------------------------------------------------------------------
  5.0      High Achievement |             Hard items
                            |
                            |
                            |
                         XX |
  4.0                       |
                      XXXX  |
                     XXXXX  |
                XXXXXXXXXXXX |
                            |
  3.0                    X  |
                        XX  |
                       XXX  |
                      XXXX  |
                     XXXXXX |
  2.0                XXXXXXX |
                      XXXXX |
                      XXXXX |
                       XXXX | 34
                  XXXXXXXXXX | 233 97
  1.0                 XXXXX | 164 112
                  XXXXXXXXXX | 134 73 60
                        XX   | 75 121 156 71 182 83
      XXXXXXXXXXXXXXXXXXXX   | 140 236 183
                      XXXXX  | 76 74 48 106 104 117 185 212 81 223 142 172
  0.0       XXXXXXXXXXXXXXX | 115 129 171 170  47 29 90 224
                  XXXXXXXXXX | 109 141 103 132 249 127 126 197 130 13 68 248
                             | 100 180
                XXXXXXXXXXX  | 92 85 150 125
         XXXXXXXXXXXXXXXXX   | 241 220 218 45 202 157
                   XXXXXXXX  | 116 135 200 14 87 122 53 91
  1.0        XXXXXXXXXXXXXX | 16 139 88 51 174 119
                   XXXXXXXX | 138 214
                    XXXXXXX | 59
                    XXXXXXX |
                         XX |
  2.0                    XX |
                        XXX |
                         XX |
                          X |
                            |
  3.0                       |
                            |
                          X |
```

```
                              |
                              |
  4.0     Low Achievement     |            Easy items
----------------------------------------------------------------------------
```

Figure 1 Person measures of achievement and item difficulty map for mathematics test (N=2,452, I=78)

Notes on Figure 1 (each X represents 11 students)
1. The scale is in logits, the log odds of answering positively.
2. Measures are ordered from low to high on the LHS and item difficulties are ordered from easy to hard on the RHS.

Category Response Curves

The RUMM program provides a category response curve for each item, which makes it possible to check whether the category responses are being answered consistently and logically. A perusal of the category response curves for the 78 items indicates that the students answered the response categories consistently and logically. The items contained two response categories, 0 for wrong and 1 for correct. Figure 2 shows the category response curve for the item 180, a moderately difficulty item (difficulty = -0.01 logits) that doesn't fit the measurement model as well as one would like. Nevertheless, the Response Category Curve is good showing that the marking for this item is consistent and logical.

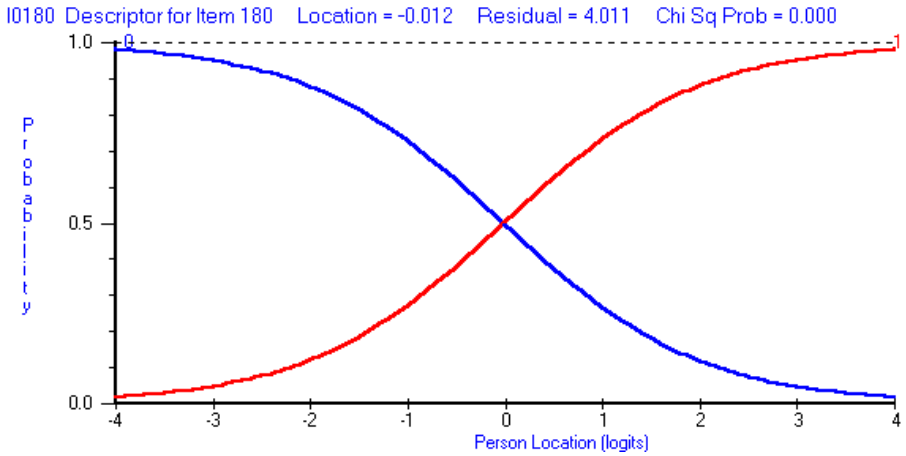

Figure 2: Response category curve for item 180 (not-so-good fitting item)

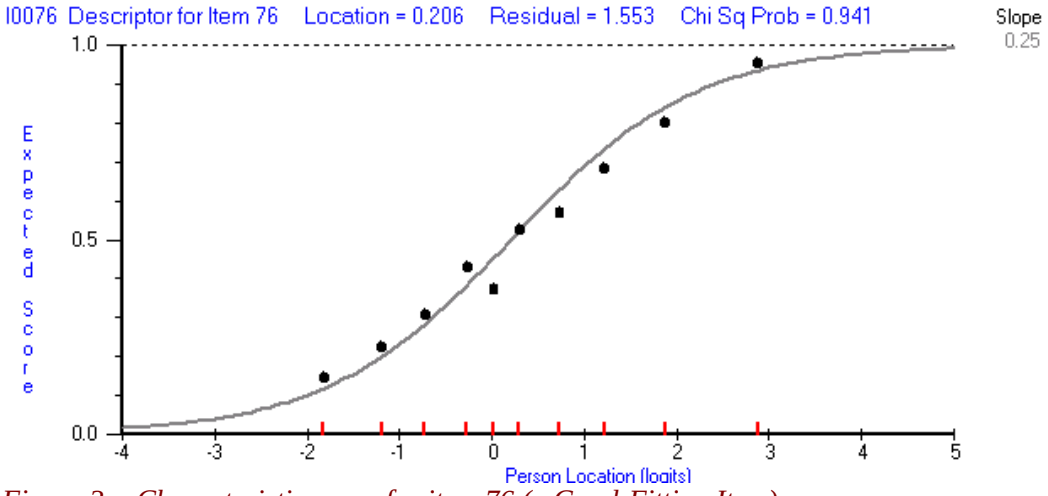

Figure 3: Characteristic curve for item 76 (a Good-Fitting Item)

Item Characteristic Curves

The item characteristic curve for Item 76 (good-fitting item) of the mathematics scale is shown on Figure 3. The line indicates the expected score of mathematics ability groups, ranging from the lowest to highest ability groups, for each observed mean measure (dots) of a student ability group. When the observed scores closely follow the curve of expected values, the group is performing as expected on the item (as shown for item 76).

Item Difficulties

After the Rasch analysis, the items were ordered in terms of their calibrated item difficulties and 'placed' in the bank. Two examples are given in Tables 2 and 3.

Table 2

Item difficulties for finding a method to solve the equations (I= 17, N=2,452)

Item Number	Item Content	Difficulty
1(150)	Finding the method to solve the equation J ÷65 = 130	-0.28
2(109)	Finding the method to solve the equation X ÷ 29 = 174	-0.15
3(141)	Finding the method to solve the equation P + 100 = 200	-0.13
4(103)	Finding the method to solve the equation 96 + L = 386	-0.12
5 (68)	Finding the method to solve the equation 16 × Q = 64	-0.04
6(100)	Finding the method to solve the equation X + 45 = 90	-0.02
7 (29)	Finding the method to solve the equation Z ÷73 = 365	+0.14
8(224)	Finding the method to solve the equation 56 + B = 168	+0.19
9(106)	Finding the method to solve the equation Z × 35 = 140	+0.24
10(104)	Finding the method to solve the equation J – 35 = 105	+0.24
11(185)	Finding the method to solve the equation L – 47 = 188	+0.27
12(223)	Finding the method to solve the equation 80 + F = 240	+0.29
13(142)	Finding the method to solve the equation 75 + D = 375	+0.37
14(140)	Finding the method to solve the equation Y + 40 = 80	+0.47
15(183)	Finding the method to solve the equation 125 + E = 250	+0.54
16(182)	Finding the method to solve the equation X + 61 = 122	+0.73
17 (60)	Finding the method to solve the equation X + 100 = 100	+0.95

Table 3

Item difficulties for finding a solution to an equation (I=9, N=2,452)

Item Number	Item content	Difficulty
1(119)	Find the solution of Q × 24 = 168	-0.82
2(116)	Find the solution of Y + 14 = 140	-0.77
3(200)	Find the solution of 21 + Z = 63	-0.70
4(122)	Find the solution of 25 × F = 25	-0.62
5(241)	Find the solution of 7 + R = 84	-0.54
6(202)	Find the solution of 11 × D = 88	-0.45
7(157)	Find the solution of A – 10 = 100	-0.41
8(197)	Find the solution of M – 38 = 152	-0.06
9(117)	Find the solution of 175 = E – 5	+0.25

The items relating to the identification of the method to solve the equations were found to be ordered from easy (item 150) to very hard (item 60) (see Table 2). Some examples are given now. Item 109

(Find the method to solve the equation X ÷ 29 = 174) and item 103 (Find the method to solve the equation 96 + L = 386) were found to be easy. Item 224 (Find the method to solve the equation 56 + B = 168) and item 104 (Find the method to solve the equation J – 35 = 105) was found to be of moderate difficulty. Item 183 (Find the method to solve the equation 125 + E = 250) and item 182 (Find the method to solve the equation X + 61 = 122) were found to be very difficult.

The items relating to finding the solutions to equations are ordered in difficulty from very easy (item 119) to moderately hard (item 117) (see Table 3). For example, the students found it very easy to find the solutions to the equations Q × 24 = 168 (item 119), Y + 14 = 140 (item 116), and 21 + Z = 63 (item 200), 25 × F = 25 (item 122), 7 + R = 84 (item 241), 11 × D = 88 (item 202), and A – 10 = 100 (item 157). They found it moderately easy to find the solution to the equation M – 38 = 152 (item 197) and they found it moderately hard to find the solution to the equation 175 = E – 5 (item 117).

ITEM BANK CONTENT

The item bank for mathematics on equations for the year 6 (Prathom Suksa 6) students contained 98 items which fitted the measurement model and consisted of:

1. Seven items relating to the identification of an equation, ordered from very easy (difficulty = -0.85) to moderately hard (difficulty = +0.39);
2. Eleven items relating to the identification of the true equation, ordered from very easy (difficulty = -1.07) to very hard (difficulty = +1.57) ;
3. Three items on identifying equations with an unknown, were all very easy (difficulties from -0.96 to -0.66);
4. Eight items on finding the value of an unknown that satisfies the equation, ordered from very easy (difficulty = -1.27) to very hard (difficulty = +1.37);
5. Seventeen items relating to Identify the Method to solve the Equation, ordered from very easy (difficulty = -0.28) to extremely hard (difficulty = +0.95);
6. Twelve items relating to finding the solutions to equations, ordered from very easy (difficulty = -0.82) to moderately hard (difficulty = +0.25);
7. Twenty-three items relating to finding a solution of an equation which related the given condition, ordered from moderately easy (difficulty = -0.23) to very hard (difficulty = +1.01);
8. Nine items on selecting an equation converted from a verbal problem or a verbal problem related to an equation, ordered from very easy (difficulty = -0.86) to hard (difficulty = +0.22);
9. Seven items on problem solving, ordered from very easy (difficulty = -0.66) to moderately hard (difficulty = +0.16).

ATTITUDE TO CAT

A Rasch analysis was conducted to create a linear scale of student attitudes to CAT involving five aspects: (1) Interest in CAT, (2) Confidence in CAT, (3) CAT as Modern and Useful, (4) CAT as Reliable, Fair and Good, and (5) CAT Recommendations. The analysis used 30 items and 400 students. Detailed results are not presented here due to lack of space, but some items were found to be very easy to answer positively. Students were very supportive of the use of CAT (item difficulty = -0.53 logits) and they wanted CAT to be used for other subjects (item difficulty = -0.41 logits).

CONCLUSION

Item banking and CAT are the assessment future. That is, assessment of achievement and ability in school subjects, using item banking and CAT, are increasing in western countries. This trend is likely to occur in Asian countries too. This is because of the increasing use of computers and Rasch measurement modelling in assessment and certification of student achievement. The ‘old’ measurement model of True Score Theory (just adding the scores on a set of questions, not ordered by difficulty, with measures not calibrated on the same scale) is unsuitable for large scale comparisons

across schools or states. Computers now allow assessment across schools and they now allow schools to help each other in assessment of achievement by pooling and calibrating items on the same scale.

Implications for Students and Teachers

With regard to teachers, computerized adaptive testing is likely to be accurate in assessing individual student's ability in any tested situation. The teachers can use it with individual students or groups without worrying about cheating in the examinations. Computerized Adaptive Testing could help prevent examinees from getting bored with having too many test items. Also, through Computerized Adaptive Testing, each examinee does different test items and a different number of items. This depends upon an individual's ability. In addition, data gained from the test can be used for many purposes, such as, to follow up an individual's learning progress, to diagnose deficiencies in each student, and to assess students' achievement. Student's weaknesses in any subject matter can consequently be remedied. Computerized Adaptive Testing is an efficient and authentic assessment of student's learning. It is recommended that teachers prepare more examples of item banks and Computerized Adaptive Testing for use in primary schools in Thailand in different subjects.

Implications for Schools and Schools Administrators

In relation to school networking, it would be useful for members of the network (teachers from many different schools) to access the item banks available through Computerized Adaptive Testing. The school network could develop a bank containing tests for different subject areas or different banks for different subject areas. This can be done by establishing one school as the item bank, equipped with a central computer, while other member schools in the network can access the bank through the networking computers in their schools. This can save time and school resources in preparing tests and conducting examinations whenever it is needed. Regarding the development of the test items, teachers in every school network could cooperate to construct, try out, analyse, and select qualified items to store in the item bank. If this process is continuously done, the item bank will become large with thousands of well-calibrated items by difficulty equated on the same scale. The pooling of resources between different schools might be launched by provincial administrators. The provincial administrators could run in-service courses on CAT and item banks, with items appropriate to many school subjects. Moreover, Computerized Adaptive Testing is a new approach for learning assessment and evaluation which is likely to be the future of assessment. There is a large monetary cost to implement this, but it would be well worth it, and probably necessary in the future.

Implications for Academics

Academics are encouraged to learn more about Rasch measurement modelling, item banking and CAT, because the increasing use of these tools will eventually move to universities. Academics will also be involved in the development of item banking and CAT programs at schools and for their own research.

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Bridging the Theory to Practice Gap Using Performance Based Simulation

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ABSTRACT

> "Simulation is a technique, not a technology, to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion." (Gaba, 2004).

There has been a growing acceptance on the use of simulation in teaching cardiopulmonary resuscitation (CPR), cardiology skills, anaesthesia skills, and crisis management largely focusing on responding to physiological events. However its use in other health and education arenas is less common due to their complexity of characterisation. There are a number of reasons for this:

- Complex performance based scenarios can be difficult to develop and to simulate.
- Performance based scenarios using standardized patient/actors seldom fit neatly into the 'textbook genre'.
- There are not always defined algorithms for managing scenarios that are not based on a physiological event, such as CPR

The use of simulation is transferable to many education disciplines, enabling the learners to immerse themselves into a simulated situation in a safe and controlled learning environment.
Using a case study approach based of a Western Australian Coroners Case Investigating the death of a patient, this paper will show case elements of the simulation as it was presented, focusing on the simulation development process, including difficulties, outcomes and lessons learnt. It will discuss the methodologies for developing learning opportunities using trained actors and standardised patients, enabling the student to expand their learning in a safe and controlled environment where they are able to develop competency in areas such as communication, leadership, team work, conflict management and facilitation, not just the technical skill.

Keywords: Simulation, Theory to practice gap, Standardised patients

INTRODUCTION

> "Simulation is a technique, not a technology, to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion" (Gaba,2004).

There has been a growing acceptance on the use of simulation in teaching health care professionals especially in the area of cardiopulmonary resuscitation (CPR), cardiology skills and anaesthesia skills. Simulation is also a technique being used in some corporate and professional groups for teaching crisis

management, communication, human resource management and leadership. However its use in other health and education arenas is less common due to its complexity of characterisation. There are a number of reasons for this.

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The use of simulation is transferable to many education disciplines, enabling the learners to immerse themselves into a simulated situation in a safe and controlled learning environment.

Using a case study approach based of a Western Australian coroners case investigating the death of a patient in custody, this paper will show case elements of the simulation as it was presented, focusing on the simulation development process, including difficulties, outcomes and lessons learnt. It will discuss the methodologies for developing learning opportunities using trained actors, enabling the student to expand their learning in a safe and controlled environment where they are able to develop competency in areas such as communication, leadership, team work, and conflict management.

The challenge for all educators is to deliver course content and learning environments that provide students with the knowledge, skills and attitudes to make a seamless transition from the classroom to the work environment. This paper provides the case for the use of scenario based learning in education and offers strategies to enhance the validity and impact of the simulated performances. A case study using this approach is described. Our contention is that using scenario based learning in rich complex scenarios within undergraduate, graduate and industry-specific, education can bridge the theory – practice gap.

LITERATURE REVIEW

Scenario-based training has been heralded as an approach to learning that enables students or participants to "practice performing tasks in a realistic simulation of the operational environment, [and to] receive exposure to a variety of nominal and unusual situations" (Mohammed, Ong, & Li, 2005).

Various definitions have been provided for what simulation is

> Simulation is the "artificial representation of a real-world process to achieve educational goals via experiential learning" (Seropian, 2003).
>
> "Simulation allows personnel to practice and learn principles in a controlled environment that will better prepare them for the safe administration of health care to patients" (Saunders, 1997).
>
> "Simulations allow learners to explore how key variables interact and affect performance" (Gaba, 2004).
>
> "Simulation is a technique, not a technology, to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion" (Gaba, 2004).

Simulation includes the use of several technologies, including part-task training devices (e.g. Intravenous insertion arms in health), sophisticated mannequins, interactive software programs and

simulated actors. How many of these modalities and how they are used is only limited by the imagination of the trainer or examiner.

For this paper we will focus on the use of simulation techniques, particularly simulated actors to create realistic scenarios for teaching purposes.

Simulation based training has been used extensively for aviation (Jentsch, & Bowers, 1998), security (both National security and IT security), military (Lynch, 2005), teaching (Kilpiö, , Laine, & Markkula, 2005) and business (Saunders, 1997). Additionally, simulation has been used by a range of health disciplines and for a broad range of teaching and examining purposes including anaesthetics, trauma management and emergency medicine. Simulation is used to teach not only for technical skills but also cognitive and communication skills such as team work and cultural awareness (Crowshoe, Bickford & Decottignies, 2005).

SIMULATION AND LEARNING THEORY

Constructivism is a learning theory that postulates "that students learn best by engaging in authentic learning tasks, by asking questions and drawing on past experiences" (Carlson,2001). Thus, an effective learning experience can be considered as one that puts the students in control and encourages active participation, exploration, reflection and the individual construction of meaning. Galarneau (2005) asserts "there is a huge disconnection between knowing something in abstract and being able to make that knowledge actionable" and quotes Siemens explanation of it being about "forming connections between islands of knowledge". Allmark (1995) proposed that in fact knowledge of practice is different from theory and cannot be reduced to it. This is exemplified in the many work environments where the experience of the individual cannot be simply reduced to a list of knowledge and skills requirements but requires the addition of adaptability; the art of juggling situational and interpersonal dynamics.

Simulation can provide students with an active learning experience closely modelled on real situations that creates a bridge between the theory and practice (Gaba, 2004). It has been proposed that simulation is supported by an educational philosophy of blended and multiple learning solutions in which change and experimentation are valued and the lines between training, performance improvement and organisational development are blurred (Kindley, 2002).

Simulation is learner-centred rather than person centred. With "real" people the "fit" of the learning experience to the trainee's level and needs is suboptimal. In simulation based training, trainees receive controlled exposure to a range of designated, pre-designed encounters. This is consistent with adult learning where trainees learn at different paces and in different styles (Ziv, Small, & Wolpe, 2000).

Through simulation learners benefit from repeated exposure to a range of scenarios that encourage them to flex their capabilities. In the process they also learn to be more flexible, handle greater ambiguity, manage resources and solve problems (Galarneau, 2005). Satish and Strenfert (2002) refer to the need for clinicians to gain "intellectual processing skills" to regulate his or her own processes of attending, learning, remembering and thinking, involving both external information as well as remembering information and concepts. The intellectual processing skills must be adjusted to changes in task challenges or dynamics (including volatility, uncertainty, complexity, ambiguity and delayed feedback) and must be adjusted to gains in knowledge over time.

Being able to put theory into practice is not all that is required. Tynjälä (cited in Kilpiö et al., 2005) discuss simulation based training as *socialization into professional culture*. The essential objective is to actively participate in authentic work practices and to familiarize themselves with the thinking and behaviour of experts. Lynch (2005) describes scenario-based training when used to train law enforcement officers, as an amalgamation of knowledge and skills-based training that incorporates psychomotor coordination and reinforces a survival mind-set in the student.

Gaba et al. (2001) relate the complexity and dynamism of clinical areas, such as anaesthesiology to other industries such as commercial aviation. Cockpit crews undertake highly realistic simulation scenarios requiring complex decision making and interaction with multiple personnel. Scenarios are followed by a detailed debriefing using videotapes of the simulation session. This approach has been extended to a wide variety of other education domains that involve complexity and dynamism. The training philosophy adapted to health care is one of training single-discipline crews to work in teams. The authors assert that simulation-based training that emphasises decision-making and teamwork principles will become commonplace in all settings in the coming decade. In Australia, Flanagan et al. (2004) have used simulation using life-size patient mannequins to address the theory-practice gap to "explore the human, or behavioural, aspect of clinical intervention" in a crisis situation.

Failure in simulation training is a critical component of learning (Shank, cited in Galarneau, 2005). Simulation can reduce error and instil a culture of safety (Fried, Satava, Weghorst, 2004) and provides a means for exploring vulnerabilities and for using that information to improve the competence of providers, the system and the interaction between the two (Ziv, Wolpe, Small, & Glick, 2003). This is an important advantage simulation has over apprenticeship learning models where failure in practice has serious quality and safety implications.

WHY USE PROFESSIONAL ACTORS IN SIMULATION?

"Acting is the study and communication of human behaviour in service of telling stories. The best actors are experts on the human condition. They are experts in using their bodies and voices to communicate all kinds of human struggles. They are expert storytellers. There is an infinite amount to learn about acting because there is an infinite amount to learn about life" (Bennett, 2007).

Art is increasingly used in educational settings around the world especially when development of complex communicative skills and abilities is targeted. In health education there has been a growing awareness of the value of the use of actors in educational drama. To discuss a patient in a consultation is clearly unethical in real life because of the need to protect the dignity of the patient.

An actor is less vulnerable because of their professional handling of the role (Jacobsen, Baerheim, Lepp, Schei, 2006). As specialists in this field it is believed that a vital ingredient of successful role-play is the use of professional actors. Actors bring realism to what can otherwise be an artificial situation. They are totally believable which draws out authentic behaviour from participants and encourages input from observers. Only by using professional actors can the character's tone, demeanour and attitude be finely tuned according to requirements ("Role play is a powerful method of selecting, training and retaining the right staff", n.d.).

Trained actors know how to take their own experiences and draw from them to create a real person who matches the role play scenario, but with significantly more depth and breadth. This comes from the actor's ability to create a real character using his or her own real experiences and real emotions. Actors are trained to tap their inner resources to create a character that is different from them, yet genuine. Along with the capability of improvising within the defined parameters of the role play, they engage participants so that the self-conscious artificial behaviours we often see in role plays are replaced by involved, genuine behaviours by the participant. They can provide credible information based on their own experiences and preparation or can quickly change the focus of the situation from the unknown facts to something more relevant. A trained actor can push a participant enough to force real involvement and real reactions without damaging the participant's self esteem and motivation to continue skill improvement.

Using professional actors to enhance nursing skills development provides students with clinical competence sooner in a cost effective and efficient way. Students are also practicing interviewing skills, communication, assessment and problem solving skills (Kerr, ND).

Reliability and validity of the actors' performance is also important. Reliability relates to the consistency of the performance. This is particularly important when actors are used for assessment as inconsistent performance introduces variation into the examination process and biases the outcome scores (Ladyshewsky, 1999). Validity refers to the how closely the performance resemble a "real" behaviour and affect. The validity of the actors' performance has been demonstrated through studies where it was identified that students' performance was not significantly different in a real situation as opposed to an actor based simulation (Ladshewsky, 1999, Wallace et al. 2002). In other words student reacted to the actors as they would to a "real" patient. Tamblyn (cited in Ladshewsky, 1999) measured the accuracy of simulated patient actors, by recording the proportion of essential clinical features presented correctly by the simulated patient. Accuracy ranged between 90-94% but some cases had scores of less than 80%. Accuracy appeared to be worse for physical examination findings and portrayals of patient effect. One third of these errors, however, were systematic suggesting they could be eliminated through training.

Training is the most significant factor influencing reliability and validity of performance. Unfortunately, few studies scrutinise the validity and reliability of the standardised patient actors they use or detail the training times for standardised patient actors (Ladshewsky, 1999). There is also little in the literature on the benchmark standards to which the simulators are trained (Wallace et al. 2002). Wind et al. (2004) developed the Maastricht Assessment of Simulated Patients (MaSP) an instrument to assess the performance of simulated patients. Seropian (2003) also emphasises the importance of creating the illusion of reality and paying attention to the details in designing simulations. He compares this with the movie industry where the director must construct complex sets with authentic props for the audience to perceive the situation to be "real" and to suspend their disbelief to relate to the characters.

CASE STUDY

An example of actor based simulation to facilitate learning was undertaken at an Australian university in April 2008. This simulation was based on a coroners' case of a death in custody from a regional Hospital.

The aim of this simulation was for the participants observing to

- Identify key non clinical events that led to the outcome of death in custody
- Discuss leadership strategies that could be implemented to prevent this scenario from occurring in the future
- Outline management strategies that could be implemented at a hospital level to prevent this scenario from occurring in the future

In summary the case involved a young man who had been involved in a serious motor vehicle accident roll over. He was an uncooperative, verbally and physically abusive young man who was admitted to the emergency department (ED) for assessment and management. He was discharged into police custody after being in the ED department for approximately 70 minutes without being examined. He died in custody and a post mortem investigation revealed multiple injuries including chest injuries, abrasions and a fractured pelvis with a ruptured femoral artery.

When developing an educational scenario using actors it is also important that the educator considers everyone that may be involved even though they all won't be in the simulation. Write the character's role outline. Use as much detail as you can. (An actor needs a detailed character study to create a complete live character for an enhanced role-play). The more you give an actor to work with, the more exciting and real your scenario will be. In giving the actors the history that has surrounded the scenario, it is important that the facilitator outlines all the emotional, physical, situational and psychological issues that have led up to the current time. From this information, the actor is able to

develop all dimensions of the character. It is also important to always write the character in the present tense, it gives the scenario dramatic immediacy.

In creating our scenario, this information included briefs such as

Nurse 1: The nurse appears tired, she is having problems with her husband and son at home and has worked nine night shifts in a row. She knows this patient as he has been to the hospital many time following drunken brawls and is always in trouble with the law. She also knows that the patient has got his 16yr old girlfriend pregnant. During her assessment and provision of care, she does not acknowledging the patient or advise the patient of what she is doing as she takes his observations. Recounting the accident and her actions at the roadside to Nurse 2 she continually offers her personal viewpoint and with opinion e.g. the patient was drunk, he stole the car; smashed the car up; he is known to us; always in trouble around town; and she tells everyone that the patient "hit her in the ambulance".

When a doctor asks if she needs any help, she states "No you need to see the other patient as he is more urgent". Nurse 1 does not think to ask for assistance with the patient, she is not communicating with the team as thinks the team are not competent to do the job as well as she can. She does not instruct other workers in what she needs them to do to help her or the patient

The challenges faced in preparing the actors for this simulation were multifaceted. The key issue in facilitating any performance based simulation is that the actors must be made aware of the learning outcomes to be achieved by the participants so they ensure that the performance supports the outcomes. It was also important to ensure that each actor has a 'whole' character so they are able to perform at all levels of human interaction. Benedetti (1986) states that "character is the material from which plots are created, for incidents are developed mainly through the speech and behaviour of dramatic personages. Characterisation is the playwright's means of differentiating one dramatic personage from another." (pg. 238).

This was an observational simulation where 80 senior health nursing practitioners observed the simulation and then undertook a facilitated learning program to identify and implement mechanisms to address the issues identified around leadership, communication and team work. Part of the learning and application of knowledge to practice involved the participants having the opportunity to interview the actors, in character, to establish factors that had motivated or impacted their behaviour in the scenario. Following these discussions the actors then replayed the simulation, applying the strategies that the participants had discussed for implementation.

Participant feedback from this simulation identified that

- 93% of participants found the session clearly identified key events and issues that led to the death in custody of the patient;

- 97% of participants reported that simulation was an effective learning tool that enabled nursing
leaders to identify leadership strategies that could be implemented to prevent this scenario from occurring again; and

- 90% of participants reported that the opportunity for group discussion assisted with the identifying management strategies that could be implemented at hospital level to prevent reoccurrence of the situation.

WHAT ISSUES DOES USING ACTORS FOR EDUCATION SIMULATION RAISE?

Hodges (cited in Wallace et al. 2002) have reported short term impacts on actors, including difficulties emerging from the characters, sleep disturbances and heightened levels of anger, anxiety and sadness. Rubin and Philip (1998) have found that actors' perceptions of their own health care were significantly worse one year after their involvement in an Objective Structured Clinical Examination. Bokken et al. (2006) reported that emotional roles are more likely to give rise to negative effects (e.g. exhaustion) than other roles although these were mild and of short duration. Debriefing with actors and participant must therefore be part of any course.

CONCLUSION

The use of simulation in education has a strong place in learning curriculums, be it for teachers, health care workers, or administrators. What is important is that the educator or facilitator is skilled to develop and apply these learning principles to their teaching modalities. Providing extensive training for actors and facilitators for education simulation helps to provides realistic learning environments and assists to prepare a workforce with the flexibility to function in the real environment.

The lessons learned from this application of the theoretical principles to practice in this case study were that:

- This is a valuable tool for presenting simulation learning
- It was an effective strategy for achieving learning outcomes;
- It is very important to prepare the actors by developing and character motivations, social, emotional and moral essence
- Actors and participants must be debriefed at the conclusion of the simulation to ensure no emotional or psychological harm
- The value of reflection and debrief to support learning and consolidation of knowledge form theory to practice.

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Educational Innovation in an International Setting

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ABSTRACT

How to make innovations in education at an Institute of Higher Education with a target audience from 60 different countries and as many different educational backgrounds? This paper discusses the educational innovations at UNESCO-IHE Institute for Water Education in Delft, The Netherlands. This UN institute, located in The Netherlands, offers Master and PhD programmes to mainly people from developing countries and countries in transition. Because of its UN-status and its special target group it is different from regular universities. To keep abreast of new technologies and educational developments, and to keep its programmes attractive for prospective students, the institute has initiated a complex process of educational innovations. More flexible learning routes for the students, more joint programmes with other universities in the world, a more learner centred approach and more e-learning are key elements of these innovations. The reasons why and the methods of, are discussed and described from the point of view of the students, the lecturing staff, and from an institutional perspective.

Keywords: Flexibilisation, joint programmes, learner centred approach, international programmes

UNESCO-IHE INSTITUTE FOR WATER EDUCATION

UNESCO-IHE, located in The Netherlands, is the only institute within the UN-system that offers fully accredited MSc programmes. The institute offers water resource policy, management, engineering and science issues in a wide variety of contexts – urban, rural and natural environments; in national and transboundary geographic settings. (Annual report 2006).

The main target groups of the institute are water professionals from developing countries. It is an international institute with students from all over the world, each with a different educational and cultural background. Although the basic principles of engineering and science are common all over the world, the content of the educational programmes is geared towards the problems in developing countries, and is aimed at connecting students to international research and contextualising local issues within global concerns.

UNESCO-IHE continues the work that was started in 1957 when IHE first offered a postgraduate diploma course in hydraulic engineering to practicing professionals from developing countries. In November 2001, UNESCO's 31st General Conference decided to make IHE an integral part of the Organisation. By March 2003, the necessary treaties and agreements between the IHE Delft Foundation, UNESCO and the Netherlands Government were signed, allowing for the entry into operation of the new UNESCO-IHE Institute for Water Education. UNESCO-IHE is governed by a thirteen-member Governing Board appointed by the Director General, and is managed by a Director and Deputy Director, both of whom are UNESCO staff members. The institute currently has 145 fulltime-equivalents staff members of which 54% are academics and 46% supporting staff.

The institute offers the following educational programmes:

- PhD programme with a duration of 4-5 years;

- 4 Master programmes, with a duration of 18 months;
- Short courses:
- regular modules, part of the Master programmes, but open for interested people;
- tailor made courses: special courses for specific target groups;
- refresher courses for alumni;
- 15 on line courses for professionals working in public and private institutions, NGOs, and academic institutions.

This paper will mainly focus on the innovations in the Master programmes.

CURRENT SITUATION MASTER PROGRAMMES

Institutional Set Up

Target groups

The target groups for all educational programmes of the institute are mid-career professionals from developing countries or countries in transition. The entry requirements are a bachelor degree, at least three years of relevant working experience and sufficient scores for English proficiency test (TOEFL 550 and IELTS 6.0 or higher). These target groups make the institute unique and therefore differs a lot with many regular universities in the world.

The interest in the programmes is high. Annually the number of applicants for the Master programmes exceeds by far the number of participants. This is due to the fact that the number of participants is completely dependent on the number of available fellowships (table1). These fellowships are received from many different donors, a.o. the Dutch government.

Table 1: Number of applicants and participants Master programmes 2003-2007
(source: Annual reports UNESCO-IHE)

	Applicants	Participants	Africa	Asia	L-America	M-East	Other	Female	Male
2003	1219	192	70	85	20	8	9	33	159
2004	1711	223	68	103	20	26	6	55	168
2005	1648	193	79	70	14	20	10	48	145
2006	1350	202	88	67	19	18	10	62	140
2007	1435	155	68	56	14	6	11	85	70

Programme structure: modular set-up

The Master programmes are set-up according to a modular structure. During the first year students follow 14 prescribed modules of their chosen specialisation. Each module has a duration of three weeks, is concluded with an examination, and has a study load of 5 ECTS. During the second year students spent 6 months (36 ECTS) on an individual research project, leading to a thesis.

After successful completion of all modules and the thesis examination students are awarded an MSc degree.

Accreditation

As the institute is hosted by the Dutch government, the Master programmes are accredited according to Dutch accreditation standards. This means that the Master programmes are implemented according to the criteria for university level master degrees as set out by the Netherlands Flemish Accreditation Organisation (NVAO). In the audit report of this organisation several remarks were made, which

amongst other circumstances, triggered the educational innovations as described in the following paragraphs.

Global developments

There are several indicators why higher education institutes, including UNESCO-IHE, should innovate their education to keep pace with the developments in the world.

Firstly there is a massification of higher education. There are increasing enrolments especially in China and India (Altbach 2007a). In China, higher education enrolments rose from 6.4 million in 1998 to more than 23 million in 2005 (Dunrong 2007). The demand for higher education has never been that high. Also UNESCO-IHE sees an increase in the number of applications for its educational programmes. Education is a public good, but is also seen as a private right to improve one's personal situation. Generally spoken, being higher educated means often a better life.

Grow of the knowledge based economies. Higher education becomes a more and more important driver for the knowledge economies of many countries. Universities play an important role in integrating information, training and research. Scientist of different disciplines have to work together to find integrated solutions for existing and emerging problems. (Altbach and Peterson 2007). Engineers will spend more and more time in international collaborations. This has important implications for the way universities offer a global perspective and an international dimension in their programmes (Borri et al 2007). Internationalisation is important, and goes beyond teaching in English, and to staff and student exchange within Europe only.

Expansion of the information technology. The nature of teaching and learning are being transformed through distance education and the use of technology in traditional classrooms (Altbach and Peterson 2007). Management has been influenced in many ways. A very visible aspect of information technology is the increasing massive storage of information.

However developing countries risk to be further marginalized in a competitive global knowledge economy because their education and training systems are not equipping learners with the skills they need. To respond to the problem, policymakers need to make crucial changes. They need to replace the information-based, teacher-directed rote learning provided within a formal education system governed by directives with a new type of learning that emphasizes creating, applying, analysing, and synthesizing knowledge and engaging in collaborative learning throughout the lifespan. (TechKnowLogica 2003)

Institutional challenges

As the institute's environment is dynamically changing, it is essential to grow along and to adapt the educational programmes in order to maximise the student learning experience. The ability for graduates to adapt quickly and effectively to a continuous stream of emerging challenges is crucial nowadays.

As stated in the strategic plan of 2007 'UNESCO-IHE wishes to serve as a standard setting body for post-graduate water education and life-long professional training.' Employers of water professionals expect their staff to continue learning throughout their professional lives to keep abreast with the latest knowledge and skills in the water sector. This was also stated in the audit report of the NVAO 'graduates need to have learning skills which allow them to continue to study in manner that maybe largely self-directed or autonomous.' (NVAO, 2006)

A Master degree nowadays is not the end station of a long learning process, but is a hallmark in a continuous process of cumulative knowledge gathering. This has serious implications for the way the

institute has to educate its students. As is stated in the Dublin descriptors (2004) graduates of university level master degree should:

- have demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with Bachelor's level, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research3 context;
- be able to apply their knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study;
- have the ability to integrate knowledge and handle complexity, and formulate judgments with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments;
- be able to communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously;
- have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous.

Pure knowledge transfer is not enough anymore. For life-long learners and global citizens it is also essential to be trained in solving problems themselves, to think independently, to have an critical attitude and to be able to communicate with people from other disciplines and other cultures.

OBJECTIVES

Realising the changes in the world and the changing demand from students and employers, serious thought was given on how to cope with this. Upon recommendation of an internal advisory committee on innovation, the institute has started a process where the education programmes will have the following key components:

1. Greater flexibility – education at UNESCO-IHE will provide greater flexibility with regard to access, content, breadth, depth, and duration of programmes, means of delivery and examination. This will involve a new approach to curriculum development taking into account interdisciplinarity and flexibility of choice, but in a coherent system which allows for modularisation and credit transfer.

2. More attention to Life Long Learning – education at UNESCO-IHE will provide opportunities for higher learning and for learning throughout life. The shift from teaching to learning implies self-regulated learning and a coaching role for the lecturer. It will also lead to a new definition of scholarship, balancing discovery and transmission as well as the integration and application of knowledge.

3. Innovative delivery – education at UNESCO-IHE will adopt new approaches for the packaging of information for course delivery. Modern ICT will have a major role in this, resulting in a in a fundamental restructuring of the ways in which teaching and learning objectives are delivered. UNESCO-IHE will place a high a value on this by ensuring that staff is adequately trained and that leaning spaces are redesigned.

4. Teaching and research – education at UNESCO-IHE will be more underpinned by its research. Tangible links between teaching and research will be key at UNESCO-IHE and can be viewed as convergent activities (research is the process of learning for academics - teaching is the promotion of learning for students).

IMPLICATIONS

In the following paragraphs the implications of each innovation will be discussed.

1. Flexibility of choice

Flexibility within UNESCO-IHE

The lack of flexibility in UNESCO-IHE's programmes was an expressed concern of the NVAO that the institute is getting a bit *'atomised'* and that students lack choice. They went on to say that '*this is not the trend in higher education where there is a move to have broader programmes..... with a lot of freedom',* and where students can '*make a free choice from a number of modules.* In response, UNESCO-IHE has stated in its strategic plan that it aims to provide greater flexibility and intensify cooperation in educational offerings both internally (within the institute), and externally (with other key institutions). In addition it has stated that '*it has a wish to offer distance, blended, and life-long learning courses for new target audiences in the world.*

A first step in the flexibilisation will be the possibility for students to select any of the modules offered at the institute. The notion of flexible learning paths and a modular curricular structure is seen as a crucial step for developing more flexible and interdisciplinary education at UNESCO-IHE. One of the main benefits of modularisation is that it will encourage wider and more diverse participation in the educational programmes, and encourage student mobility. The modularisation process will also guarantee that students are able to obtain full recognition of credits legitimately obtained at other institutions of higher education, and the transfer and / or accumulation of these, which is currently not the case.

Currently the responsibility for the content, structure and quality of the Master programmes is the responsibility of various programme committees. Increasing the freedom of choice for students is not an easy task as it means removing the walls between programmes, and removing some entry requirements for modules etc. To make this happen tactful and thoughtful manoeuvring at central level is essential. A framework for a flexible programme is under construction. It is expected that by 2009 the first steps in a flexible set-up can be taken.

The institute currently works towards a system whereby students can also obtain credits via short courses. After a successful pass of the examination credits are obtained, which may give exemptions for following parts of a full Master programme at UNESCO-IHE or another university.

As can be seen in the tables below the interest in short courses is increasing. There is a substantial grow in the number of participants (tables 2 and 3). Compared to 2003 the total number of applicants and participants for the short courses in 2008 has doubled. The number of applicants for the short courses almost reaches the figure of applicants for the Master programmes (see table1).

Table 2: Number of applicants and participants short courses (including online courses).

	# short courses	# applications	# participants	
2003	34	615	256	42%
2004	50	752	237	32%
2005	74	1191	488	41%
2006	70	1187	468	39%
2007	63	1266	499	39%
2008		1335	413	

Table 3: Number of participants online courses.
** this figure will rise as not all numbers are known yet for the 2008 autumn courses.*

	# Participants
2005	85
2006	104
2007	131
2008*	105*
Total	425

In 2005 UNESCO-IHE offered 9 online short courses. This figure grew to 15 courses in 2008. The number of applicants and participants grew in a similar fashion. As can be seen in table 4 the highest number of applicants for the on-line short courses does come from the African continent. Relatively spoken however their participation level is unfortunately the lowest. To find more fellowships for these participants is one of the challenges for the institute.

Table 4: Number of applicants and participants on-line courses per continent for the period 2005-2008.

	# Applicants	# Participants	
Africa	295	112	38%
Asia	203	104	51%
Europe	157	138	88%
S-America	88	54	61%
N-America	14	9	64%
Australia	12	8	67%
Total	769	425	

Flexibility outside UNESCO-IHE

Credits for courses can also be earned by following courses at other universities. UNESCO-IHE has adopted the European Credit Transfer and Accumulation System (ECTS). In the ECTS system at least 60 credit points are divided over one academic year. An internal procedure for credit transfer to and from other universities is under construction. Credit transfer can only be established via an agreement between co-operating institutes. By ensuring that students receive appropriate recognition for learning already achieved, efficiencies in both time and money can be gained by students and institutions. Different programmatic set-up of programmes (modular, semester, trimester systems) makes it however sometimes difficult to change form one institute to another institute.

The ability for learners at all stages of their lives and careers to easily move into, between, and out of, post-graduate education is a key component in building an education system that makes lifelong learning a reality.

Joint programmes

Two types of arrangements can be discerned: collaborative and non-collaborative arrangements. The former include franchising, twinning and joint degrees whereby study programmes, parts of a course of study, or other educational services of the awarding institution are provided by a partner in another country. The latter include branch campuses, off-shore institutions, corporate and international institutions whereby study programmes, parts of a course of study, or other educational services are provided directly by an awarding institution in one country to another country or countries. UNESCO-IHE offers both types of arrangements with different partners. Under the Dutch law implementing a joint programme is not a problem, however issuing joint degrees is not allowed yet. Graduates of

current joint programmes are therefore awarded an UNESCO-IHE degree, mentioning the affiliation with the partnering institute(s) or two degrees; one from their own university and one from the host institute.

Experience has learned and many examples in the world have shown that it is necessary to describe the organisation, the responsibilities and all inputs and revenues before the start of a programme in a contract between cooperating institutes / faculties. Agreement on the set-up and the content of curriculum should be achieved. Quality assurance procedures should be clear and set.

UNESCO-IHE currently offers 2 joint programmes:

- the programmes are developed and/or approved on an equal basis with another institute;
- students from each participating institution study parts of the programme at other institutions;
- the students' stays at the participating institutions are of comparable length;
- periods of study and exams passed at the partner institution(s) are recognised fully and automatically;
- professors of each participating institution also lecture at the other institutions, work out the curriculum jointly and form joint programme committees;
- after completion of the full programme, the student either obtains two degrees: one from UNESCO-IHE and one from the other university

Several other joint programmes are currently under construction.

Advantages of joint and double degree programmes

The advantage for the student in such joint (or dual) degree programmes is the possibility to complete two, two-year courses in 3 years. It broadens a student's knowledge and skills base and improve their career options in competitive, increasingly interactive fields. They gain international experience and are able to develop an international network.

For UNESCO-IHE and the cooperating universities the advantages are that it is unnecessary to have all knowledge in house, and that teaching costs are reduced. Through these co operations unique programmes can be created, it creates closer cooperation with other universities and it enhances the global visibility of the institute.

Problems

Apart from a proper preparation by the institutes, still serious problems may be encountered, such as:

- Scarce legislations

As already mentioned above the majority of the European countries have no legislation specifically concerned with the development of joint programmes and the award of joint degrees. In The Netherlands it is by law still not allowed to issue a joint degree with a foreign partner. Issuing double degrees is not legally protected and occurs occasionally everywhere. In the United Kingdom and Ireland, the power to award degrees lies with the universities, so the lack of legislation implies that there are no restrictions on their award.

- Finances

Financial constraints lay mostly at the heart of the development of joint programmes. To be successful both (all) parties must to take a share in the costs of development and implementation. These costs refer to both programme and student costs. For the current (and for the future) joint programmes the management of the institute and the partner institutes developed a business plan, outlining the programme costs and revenues.

- Quality assurance

A specific issue related to joint programmes is quality assurance. As the UNESCO-IHE degrees are accredited by the Dutch government, the institute has to assure itself of the quality of the courses offered by the partner institutes. The quality of the teaching staff, the lecture materials, equipment etc. as defined by the Dutch accreditation system must be of the same level as at UNESCO-IHE. This requires a thorough system of quality assurance. An international system of accreditation does not exist yet. This may lead to concern about the mutual recognition of the degrees and global mobility of students (Patil, Godner 2007)

- Culture shock

For students it is sometimes difficult to adapt to a new environment. At the start of the academic year UNESCO-IHE always organises an introductory period, during which students are informed about living and studying in The Netherlands. A mentor is assigned to a group of students and counsellors at the student office are responsible for the social welfare. In case of problems help is offered.

2. Life long learning

In the coming years UNESCO-IHE will be an institute that promotes innovation in the design and delivery of teaching and learning activities, to improve the quality of the students experience. It will promote pedagogical and didactical methods that are learner-centred and will arouse curiosity, stimulate independent learning and encourage the development of critical thought in its students. The focus will be on enhancing student learning and encouraging sustained self-development (life-long learning). A tool for student learning is Problem Based Learning (PBL). Coming years this method will be promoted within in the institute, along the existing didactical methods.

An overwhelming body of research shows that students do not learn effectively from lectures and that lectures do not support/build competencies needed for life-long learning. On the other hand problem-based learning has proven to enhance students' critical thinking and independent learning. It does so by focusing on activities rather than knowledge gained, encouraging deep rather than surface learning (by increasing learning engagement and interaction with the learning material). In addition, it situates the learning in the context of a real-life situation and encourages an appreciation of teamwork and the value of others. More importantly, it teaches learners how to learn for themselves, carry out research and find new sources of knowledge. This component of the PBL approach helps to develop lifelong competencies (as it fosters the learning ethic).

For UNESCO-IHE, the distinct advantage of the PBL approach is clear, as it will produce better water professionals who have: knowledge more clearly linked to their specific areas of application; the ability to continue to learn throughout their career; the ability to work in multidisciplinary teams; ability to effectively articulate and communicate their ideas

The question is whether students will appreciate a PBL approach. A study by UNESCO-IHE among its students revealed that most students during their bachelor study were educated according to a lecturer centred approach: lecturer talks and the student is a passive receiver of information. They nearly all indicated that they would appreciate a more communicative or task-based approach. This is not surprising, as various adult learning theories (i.e. Knowles) indicate that adults want to know why they have to learn something, they learn experientially, they approach learning as problem solving and they learn best when the topic is of immediate value.

A study by Huang (2005) revealed that Chinese students studying tourism-related courses in the UK found PBL more interactive than their old learning style, and allowed them to learn on their own. However, some negative perceptions were also expressed. In particular, the students had a large psychological obstacle when it came to debating a subject with their lecturers. Debating among them was not a problem.

It is recognised that shifting to a PBL approach involves a large cultural change, both for students and lecturers, and that it can also be a daunting and time-consuming task (to restructure existing courses). However, by effectively managing the change process and encouraging staff to learn and adapt new skills progressively, the transition can be made successfully to reap the long term benefits. It should be noted that UNESCO-IHE already has excellent examples of this mode study in its MSc programmes, and the challenge is to mainstream this. Adequate and sustained staff development programmes will provided to staff to ensure they have the skills of learning and the ability to change, required to successfully implement the learner centred approach.

In addition, the institute will embark on a redesign of its learning spaces so that they become a physical representation of the institution's vision and strategy for learning.

3. Innovative delivery: Blended Learning/Distance Learning

Blended learning is the effective integration of various learning techniques, technologies, and delivery modalities, with the objective of optimising the learning outcome and cost of program delivery. For an effective problem based learning approach, blended learning is crucial as it offers an opportunity for moving beyond content acquisition to develop skills and dispositions needed for lifelong learning.

The integration of an e-learning environment and a classroom environment is likely to combine ideally the advantageous aspects of both types of instruction. Education through e-learning supports education in Delft as well as education on distance. It provides the flexibility and the efficiency which cannot be assured in a classroom environment, whereas a face-to-face education class ensures the social interaction in which the students will need guidance for learning. Combing delivery modalities provides an environment where the learners can study regardless of time and place restrictions according to their learning speed. The factors such as learners' individual differences, personal characteristics and learning styles have significant impacts on the learning environment.

UNESCO-IHE strives that all modules will be delivered in a blended format, where a combination of face-to-face, e-learning and collaborative learning environments will be used. In the near future students will take their own time to go through the lecture materials and study sheets that will be made available online, and also research relevant topics in greater depth using the web. Students will have the opportunity to be prepared for the face-to-face sessions, having gone through the relevant material beforehand. During the face-to-face sessions, the lecturers will reinforce topics and clarify issues and concerns of the students. Also all students will be using communication and collaboration tools like online forums, chat, and e-mail to facilitate discussion and learning among student peers and lecturers.

The implication of all this is the availability of an excellent virtual learning environment (VLE). Offerings are currently explored to integrate the existing programmes into one environment, where students, alumni and staff have easy access. The international dimension of the institute however puts high demands on the choice of a VLE. Easy communication with students all over the world is an essential feature, knowing that internet connection in several parts of the world is still slow or unavailable.

4. Teaching and research

One of UNESCO-Ice's research/teaching philosophy (as stated in the Research Strategy), is that the teaching/research link is a central/integral part of the research strategy and the teaching and learning strategy. UNESCO-Ice's aims to '*ensure that links between staff research and teaching and learning are made explicit in departmental strategies for research (and learning and teaching)*.'

At a first glance the teaching-research link is about reporting on the latest research work in the courses.

The Engineering Subject Centre of the Higher Education Academy in the UK (2005) on their website reported how discipline-based research could benefit teaching, and vice-versa. Responses indicated the following possible links:

1. Content of curriculum - is partly or completely derived from research.
2. Processes - students are taught/learn in research-like ways, typically through enquiry/project based activity.
3. Tools - students learn how to use particular equipment, software packages, etc. and hence learn research skills.
4. Context and community - intangible links and benefits to students and staff flowing from students being part of a researching community.

Based on discussions within UNESCO-IHE the following conclusions were drawn:

- Students should be trained to approach learning with a research approach ("Process link"). In this students will develop critical skills. Due to cultural differences this may be easy for some students than others. However, it is important to produce "lifelong learners".
- This research approach will be taught from the beginning of the programme with state-of-the-art research being introduced later on. This is needed to ensure that teaching is at the forefront of knowledge and to maintain the standard of the MSc programmes.
- At an institutional level a clear difference will be made between research and project work. PhD students will assist in the MSc projects to both develop MSc students' skills and the general research culture within the institute.

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‘Plan your study around your life, not the other way around’: How are Semi-Engaged Students Coping with Flexible Access?

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ABSTRACT

Higher education ad campaigns that promote flexibility of study arrangements are gaining momentum in Australia and elsewhere. Edith Cowan University (ECU) acknowledged the competition between prospective students’ study time, paid work and/or family commitments with its slogan “Plan your study around your life, not the other way round”. ECU’s promotion of ‘flexibility’ is understandable in the current competitive and market-driven economic climate. However, what are the consequences of universities becoming so reactive and responsive to the demands of ‘paying customers’ and market pressures? What is the price of flexible access? This paper will analyse the rates of academic success of a sample of first-year teacher education students and their patterns of engagement. Although tentative at this point, the results of this preliminary study show that while ‘flexible access’ is desired by many, some students are not attending lectures and are not taking advantage of audio recording provisions. Thus, it is inferred that some first year students are not coping with flexible access provision. Following this line of analysis and discussion the conclusion is made that universities have an ethical obligation to assist students improve their engagement levels, especially in first year.

INTRODUCTION

It is widely recognised that student expectations of higher education provisions are increasing as students anticipate ready access to course materials in various forms, flexible course structures, recordings of lectures, extensive assignment support and feedback, speedy assignment returns, and ready access to lecturers and tutors (James, 2007; McInnis, James & Harvey, 2000; McInnis & James, 1995, Turnbull, Nettelbeck, Ward, LeCouteur, Sarris, Strelan, Crisp, Palmer & Schneider, 2006). As today’s university students’ expectations of university services intensify, a growing number of teaching staff raise concerns about student engagement and motivation levels, students’ time-on-task and presence in lectures, tutorials or workshops (Devin, James & Grigg, 2007; Goodyear, 2007, Kuh, 2003, McInnis, 2001). Universities feel under pressure to respond to student expectations (e.g. Turnbull, *et.al*., 2006; Ipsos Mori, 2008). In addition, ad campaigns that promote flexibility of study arrangements seem to be gaining momentum. For example, Edith Cowan University (ECU) acknowledges the competition between prospective and enrolled students’ study time, paid work and/or family commitments with the slogan: “Plan your study around your life, not the other way around” (see Figure 1)(The Sunday Times, 2008; ECU web portal [August 2008]).

"Plan your study around your life, not the other way around!"

"ECU provided an easy-going, flexible learning environment where I was able to excel. My degree provided me with the knowledge, qualifications and experience to immediately land a job as a graduate accountant. But my education hasn't stopped there - the accessible ECU postgraduate courses mean I can continue to progress my career at an accelerated rate – while I earn."
ECU Accounting student

Figure 1: ECU Ad campaign

ECU's promotion of 'flexibility' is strategic in the current competitive and market-driven economic climate. However, what are the possible ramifications of reactive and responsive strategies for semi-engaged students who fail or receive low pass grades?

This paper reports on a preliminary study that begins to explore the nature of what is often termed 'deep-engagement' or 'semi-engagement' of students who either receive very high or very low grades in their first year of university study. The discussion begins with the provision of a brief overview of an understanding of deep engagement versus surface or semi-engagement and how engagement levels can best be measured. This is followed by a case study of one program's transitional practices as it moves from fixed to more flexible learning provisions in response to changing student expectations. Next, a brief exploration of the importance of generational profiling, (most of our first year teacher education students are school leavers, Gen Y students) is offered. Finally, some contextual information about the study, its methodology, some key findings and possible implications is offered.

MEASURING ENGAGEMENT

The research literature on student engagement seems to agree on the definition that students who are motivated and skilled at employing learning strategies that suit their learning styles, are actively engaged in exerting effort, initiating action and spend significant time on task (Spanjers, Burns, & Wagner, 2008; The Australian Council for Educational Research, 2007). Conversely, less motivated and/or less skilled students "are passive, do not try had, and give up easily in the face of challenges" (Skinner & Belmont, 1991, cited in Brewster & Fager, 2001). Following McLaughlin, McGrath, Burian-Fitzgerald, Lanahan, Scotcher, Enyart, and Salganik, (2005), the phrase 'Student Content Engagement (SCE)' is used as it focuses on the students' relationship with specific subject matter knowledge. Further, the author steers clear of the term 'disengagement' or 'shallow' engagement and use the term 'semi-engagement' to avoid portraying 'deficit' views of students who more often than not seem to make deliberate choices, when and how to engage with the subject matter presented. McInnis (2001) notes:

Taking a deficit view makes it inevitable that our responses to the new realities of student expectations and aspirations will be inadequate. Such a view does certainly not help universities to respond to this generation of highly mobile and technologically connected students with demands and assumptions that many academics find difficult to accept. (p. 4)

The literature dealing with student engagement levels has grown considerably in recent years (Krause, 2005; ACER, 2007). Much of the past research focused on individual engagement levels in isolation. However, this is changing now as strategic plans on program-school-department levels are developed to better align services to students (Kraus, 2005; James, 2007).

NEWLY DRESSED TRADITIONAL PRACTICES

The reactivity of ECU is clearly visible in the slogans used in promotional materials, where 'flexibility' is seen as the 'catch-cry' (see Figure 1). Although there are comparable issues facing all universities, learning and teaching practices differ between and within universities, faculties, schools and programs. Here, the Kindergarten through Primary Program (K-7) at ECU is used as a case study. The intention is to demonstrate my understanding of the structural influence of some students' semi-engagement. Newly enrolled students in the K-7 program at ECU are provided with a number of options of flexible access (see Table 1).

Table 1: Flexible access provisions in the K-7 program

Description of Service	**Availability**			**Additional Information**
Flexible entry	Yes			Students are able to commence their studies in February (Semester 1) or August (Semester 2)
Negotiating study load (a) Full-time or Part-time study			No, but…	Students are strongly encouraged to enrol on a full-time basis but can, if they wish to, enrol on a part-time basis or change their enrolment status to part-time during the course of the study.
Negotiating study load (b) fast-tracking/overloading			No, but…	In the past, first-year students were unable to enrol into units that are offered as second/third or fourth-year unit. However, since the commencement of this year, students can enrol in as many units they wish, without the need for a formal application of 'unit variation'. Further, students who failed a unit previously can stay in lock-step with their 'full-time' peers and re-enrol in the unit they failed. This is referred to as 'overload'.
Enrol as an external student		No		Students need to attend face-to-face (F2F) lectures and tutorial sessions.
Enrol into preferred tutorial time slots			Yes, but…	Students enrol on a 'first-come-first served' basis. Enrolment into tutorial sessions that directly follow the lecture are the most preferred.
Listen or view lecture recordings online			Maybe	More and more lecturers make lecture recordings available, but this is not a standardised practice and no policy directive is provided.

The possibilities open to newly enrolled students in the K-7 program are not clear cut. But, there is a trend towards increasing provisions for course flexibility. The transition from fixed to more open provisions, as exemplified in this case study, may be problematic, especially for students who 'don't know what they don't know'. The mixed message of 'maybe flexibility' is not only confusing, but it may also weaken students' commitment and engagement. This leads to the possible conclusion that the university culture and practices affect student engagement. Based on this view, it is contended that students should not be made solely or even primarily responsible for their choices. They are

themselves greatly responsive actors in a changing world. University teaching practices can enhance, but can also greatly hinder or constrain, student engagement (see Towler and Bamber, 2005).

The adherence to a fixed structures of a one-hour lecture that is followed by a two-hour tutorial on the same day or a day close to the lecture, where attendance is greatly encouraged but not compulsory or enforced, is the norm in the K-7 program, as in many other courses at ECU and elsewhere. This may be an outdated practice, but this line of enquiry will not be pursued in this paper.

THE GEN Y FIRST-YEAR TEACHER EDUCATION STUDENT

Generational profiling is only one of many commonly used demographics and refers to the characteristics of people similar in age. Beside age, other demographical data used to profile people include race, gender, income, mobility, education attainment, home ownership, employment status, location etc. Educators, who wish to maintain and improve educational quality, need to gather reliable demographic data on their students. The term generation Y or 'net generation' (Oblinger, 2004), describes students who are born approximately between 1980 and 1994 (McCrindle, 2008). Many of these students are now attending university. This particular student group is seen to be 'confident', 'tribal in nature', with 'zero tolerance for delays', and prefers multi-tasking (ACER, 2007; Jonas-Dwyer & Pospisil, 2004; Kennedy, Judd, Churchward, Gray, & Krause, 2008; McMahon & Pospisil, 2005). However, many of these character traits may be perceived to be challenging for educators as Krause so aptly notes:

> For the multitasking Y Generation student … university study runs the risk of simply becoming another appointment or engagement in the daily diary, along with paid work and a range of other commitments beyond the campus. (2005, p. 8)

Is there a need for awareness of, and, where possible, provision for Gen Y students' changing characteristics and life styles? ECU's promotional material seems to be addressing this question. However, as the case example (see Table 1) illustrates, the traditional course structures of the Kindergarten through Primary Program (K-7) teacher education program, constructed for an industrial age education population with very different mindsets and expectations, is slow to adjust and respond to the expectations and perceived needs of the busy, multi-tasking, confident, mainly Gen Y student cohorts entering the program as first-year students.

THE STUDY

The results presented in this paper are part of an ongoing study associated with the author's teaching duties in the Kindergarten through Primary Program (K-7) in the School of Education at ECU. This program is located on the Joondalup campus and student enrolment numbers have grown steadily since its inception in 2002.

Students' intrinsic involvement in learning, also referred to as student content engagement (SCE), can only be measured indirectly through process indicators, such as students' involvement with lectures, meaning not only attendance, but rather physical and mental presence. Agreeing with Krause (2005), it is noted that "while time spent on a particular activity is a limited indicator of engagement, it is nevertheless a useful starting point" in understanding how various student groups are coping with increased flexible access provisions (p.4). The systematic monitoring of academic learning time (ALT) and time-on-task (TOT) are now being increasingly used as a proxy for SCE (ie. Spanjers et al, 2008). In this case, on-task-behaviour means either attending face-to-face (F2F) lectures or listening to the lecture recording, as it cannot be disputed that "students require exposure to new knowledge in order to learn …[and]… learning occurs through the cognitive engagement of the learner with the appropriate subject matter knowledge" McLaughlin et al, 2005, pp 2-3).

The main purpose of the pilot study was to explore the impact of some students' decision to attend or not attend F2F and/or access recorded lectures, with a particular concern to uncover the relationship between lecture attendance and academic performance of first-year teacher education students in one unit. The three research questions were: Who copes/struggles with flexible access provisions? Who attends F2F lectures? Who uses remote access provisions, such as lecture recordings? A related aim of the study has been to understand the potential effect of changing university practices in response to students' shifting expectations, especially the growing demand for flexible access. The idea is to gain a deeper understanding of the level of responsibility attributed to the individual student and the university system with regards to some students' semi-engagement.

The Design

The research design is a simple correlation between the two variables: (a) academic achievement and (b) lecture attendance (as proxy for engagement). Based on the student engagement literature cited above, students who achieved higher marks are expected to show higher attendance rates. The cases comprise sub-groups of students enrolled in one first year unit in the K-7 program. The unit entitled: Becoming a Teacher is a compulsory first-semester, first-year unit. Engagement levels of students who achieved a High Distinction grade (80% or above) or very high Distinction grade (78% or 79%) in the unit (HD/D-Sts) were compared to engagement levels of students who achieved a Fail grade (49% or below) or a low Pass Grade (52% - 50%) in the unit (F/P-Sts). F2F lecture attendance records and lecture recording access data were compiled over a 12-week period (Semester 1, 2008) and a data mining technique was used to analyse the data (see Table 2).

Perceived Advantages of a Data Mining Technique

In this research, a data mining technique is used to gather relevant data. Data mining, also referred to as 'knowledge discovery in databases' (KDD), is a research method that facilitates the extraction of meaningful information from unstructured data sets (Zhao & Luan, 2006). The author's preference for this method is based on the following three main reasons: First, there is growing evidence that survey response rates, which traditionally have been less-than-ideal, are falling (Porter & Umbach, 2006; Porter & Whitecomb, 2005). This phenomenon is commonly referred to as 'survey fatigue syndrome' (Coates, 2006; Porter, Whitcomb & Weitzer, 2004). Second, since participation in a research project is optional for students, it seems likely that the survey sample is skewed towards the more engaged students. Third, willingness to spend time and energy to engage with research for the common good rather than individual benefit may seem to be an even greater indicator of intrinsic involvement with learning for Gen Y than the general student population, based on their generational characteristics (McMahon & Pospisil, 2005). As this behaviour could have serious consequences for the validity and reliability of the data, and "if surveys of student engagement are being answered by a disproportionate percentage of engaged, cooperative students, the resulting data may reflect inherent biases that are not trivial to correct" (Clarkberg, Robertson & Einarson, 2008), there was a perceived need to use a research technique that was able to provide more reliable data.

Table 2: Data source, data collection technique and data analysis

Data Sources	Data collection techniques	Data analysis
(a) lecture attendance sheet (b) access data of lecture recordings in Blackboard (c) final marks record sheets	Data mining technique from readily available datasets. Creating two histograms or datasets (database of students (HD/D-Sts & F/P-Sts) who attended lectures & database of students who accessed lecture recordings)	The data has been used to create various graphical representations of the target audience to help answer several important questions: What patterns are there in my data? Which patterns are significant? What is the high level summary of the data collected?

Participants

A small sample of first year teacher education students was used to carry out a detailed analysis of students' learning practices. The lecture attendance data (1 hour F2F lectures held on Monday mornings, 8:30 am to 9:15 am), lecture recording access data and performance data of 226 students enrolled in the unit EDL1000 – Becoming a Teacher were analysed. This is a compulsory first-semester, first-year unit for teacher education students enrolled in the K-7 program and is offered in the School of Education at the Joondalup Campus. The semester is 12 weeks long and contains a two-week study break. Although 272 students were initially enrolled in the unit, students who withdrew prematurely from the course or did not grant permission for their data to be used for research purposes were excluded. An ethics clearance was obtained. Out of the 226 eligible students, only 59 students qualified based on the categories outlined above.

The Findings

The histogram (Table 3) shows the student variables used in this study. Out of the total 59 students, 15 qualified as High Distinction Students (HD/Sts), four as high Distinction students (D+/Sts), six as Fail students (F/Sts), and ten as low Pass students (P-/Sts). Unfortunately a number of fail students needed to be excluded as they declined their permission for the data to be used in research.

Table 3: Histogram of eligible and participating students

Personal ID	Final Mark & Grade	F2F Lecture attendance (out of 11)	F2F Lecture attendance Pre semester break (out of 7)	F2F Lecture attendance Post semester break (out of 5)	Accessing lecture recordings (podcasts)
HD/ St-1	83	10	5	5	28
HD/ St-2	86	10	6	4	11
HD/ St-3	82	6	5	1	8
HD/ St-4	81	10	5	5	11
HD/ St-5	80	10	6	4	12
HD/ St-6	80	3	2	1	4
HD/ St-7	81	9	4	5	10
HD/ St-8	81	0	0	0	2
HD/ St-9	80	8	4	4	9
HD/ St-10	85	9	4	5	9
HD /St-11	81	9	4	5	13
HD /St-12	80	9	5	4	35
HD /St-13	82	2	2	0	13
HD /St-14	88	11	6	5	12
HD/ St-15	80	11	6	5	11
D+ /St-1	79	10	5	5	3
D+ /St-2	79	7	4	3	1
D+ /St-3	78	6	5	1	1
D+ /St-4	79	10	5	5	1
F/ St-1	18	7	3	4	0
F/ St-2	48	3	3	0	0
F/ St-3	47	7	4	3	0
F/ St-4	33	7	5	2	0
F/ St-5	47	7	6	1	0
F/ St-6	42	11	6	5	0
P-/ St-1	51	7	3	4	1
P-/ St-2	50	7	5	2	1
P-/ St-3	50	5	2	3	2

P-/ St-4	52	8	4	4	1
P-/ St-5	51	10	5	5	1
P-/ St-6	53	6	4	2	12
P-/ St-7	52	5	5	0	1
P-/ St-8	50	3	3	0	2
P-/ St-9	52	6	5	1	1
P-/ St-10	52	11	6	5	3

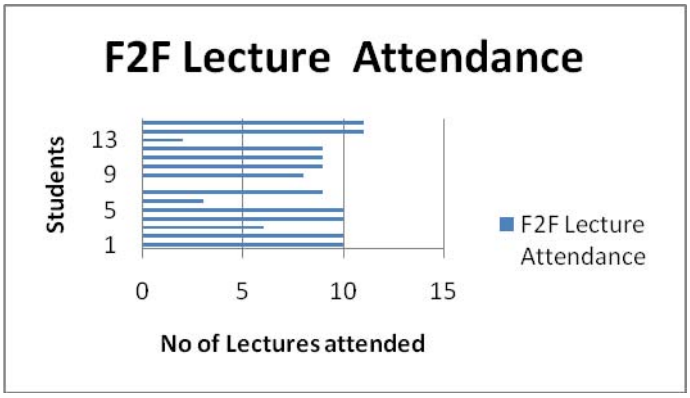

Figure 2a: HD/Sts – F2F Lecture Attendance

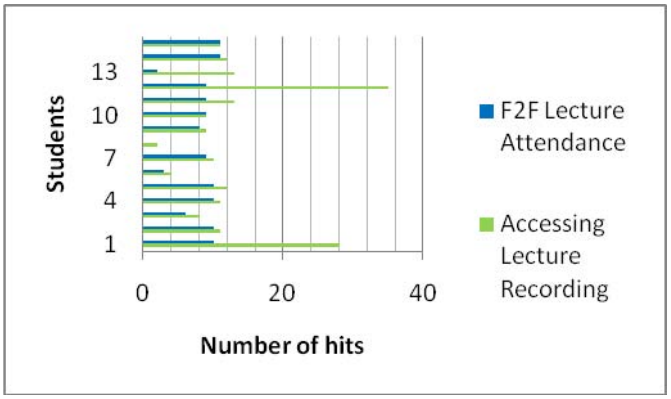

Figure 2b: HD/Sts –
F2F Lecture Attendance & Lecture Recording hits

HD/Sts' Engagement Levels

These graphs illustrate that HD/Sts are generally attending a high number of F2F lectures and accessing lecture recordings regularly. Students who were attending less than 90% of lectures (fewer than 9 out of 11 lectures), kept up to date with the content and processes of the lectures via lecture recording access. This is most prominently evident with HD/Sts-13. Interestingly, HD/Sts-8 did not attend any lectures and made minimal use of lecture recordings. The written support materials provided in the unit must have been sufficient for this student to succeed.

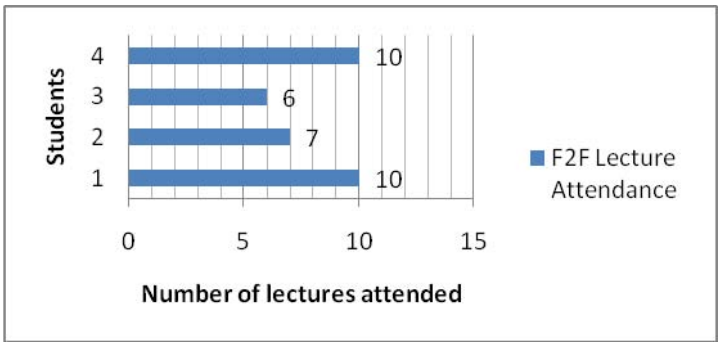

Figure 3a: D+/Sts – F2F Lecture Attendance

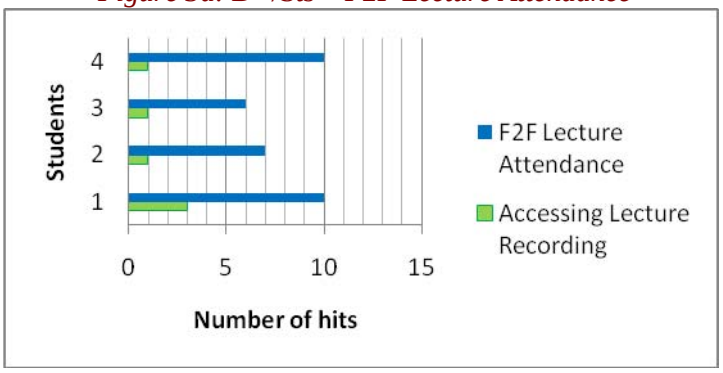

Figure 3b: D+/Sts –
F2F Lecture Attendance & Lecture Recording hits

D+/Sts' Engagement Levels

The above graphs (Figures 3a & 3b) show that the four students recorded varied attendance rates between 55% - 90% of F2F lectures. Interestingly, these students accessed the lecture recordings to a significantly lower level than HD/Sts.

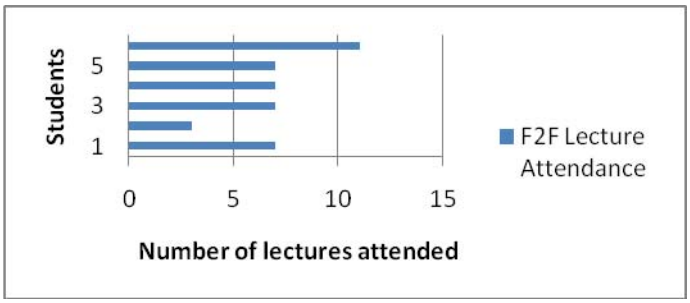

Figure 4a: F/Sts – F2F Lecture Attendance

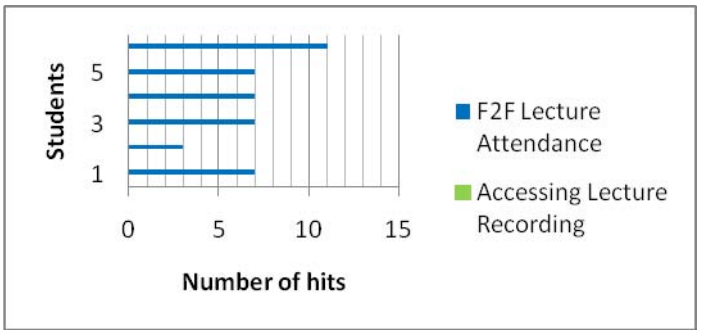

Figure 4b: F/Sts –
F2F Lecture Attendance & Lecture Recording hits

F/Sts' Engagement Levels

The most interesting finding is that there is not a significant difference between the above two sets of graphs (Figures 4a & 4b). This means that none of the six F/Sts accessed the lecture recordings. The zero recording of hits suggests that most likely these students did not even attempt to access any of the 11 recordings. However, it may be possible that they could have accessed the downloaded recording of another student, but I deem this a rather unlikely scenario. One student who failed the unit, F/St-6, attended 100% of F2F lectures and four students attended 64% of F2F lectures. These students may show engagement that they are unable to convert into positive academic achievement results.

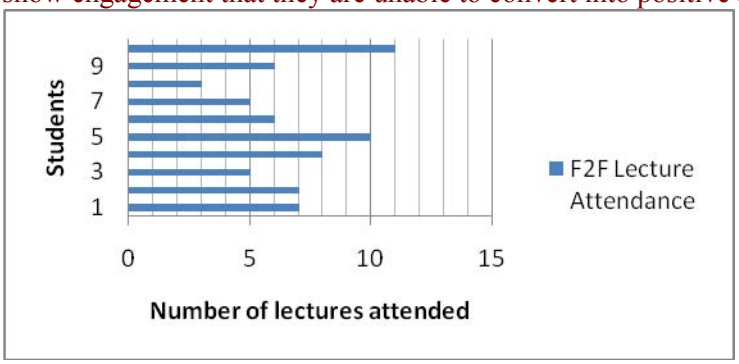

Figure 5a: P-/Sts – F2F Lecture Attendance

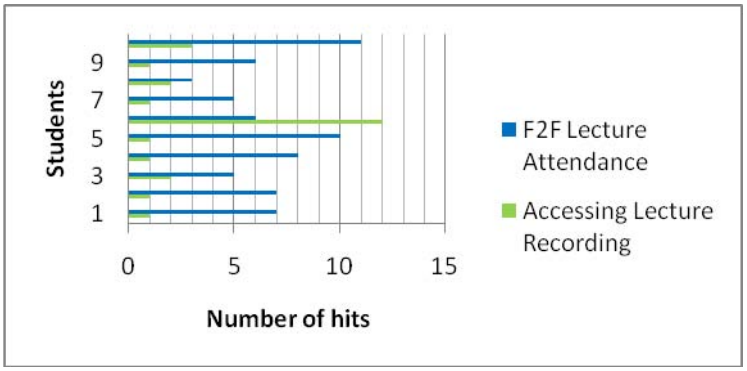

Figure 5b: F/Sts –
F2F Lecture Attendance & Lecture Recording hits

P-/Sts' Engagement Levels

The above data (Figures 5a & 5b) set reveals that the majority of these students attended over 50% of the F2F lectures and attempted to access lecture recordings to varying degrees. At least three of these

students seem surprisingly engaged (St-5; St-6; St-10), whereas St-8, St-7, and St-3 seem to be struggling with engagement.

Comparing Pre- and Post-Semester Break Engagement Levels

The comparison between pre- and post- semester break data was sought to reveal a more precise picture of SCE and who copes/struggles with flexible access to study as increasingly demanded by Gen Y students and promoted by ECU.

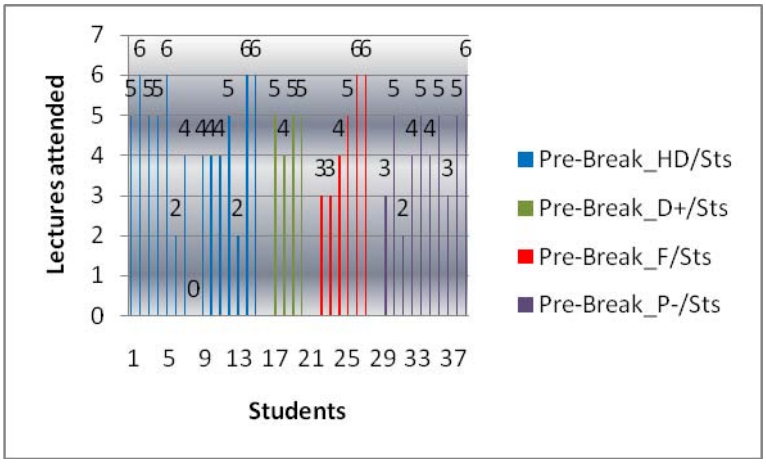

Figure 6: Lecture Attendance comparison – Pre- Semester Break

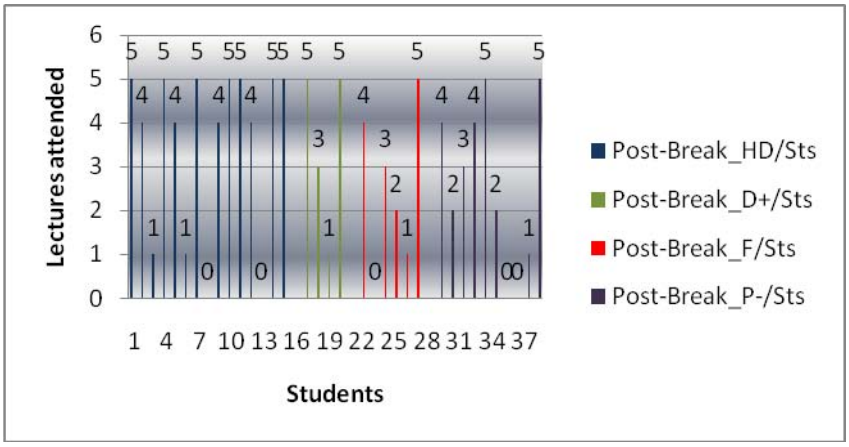

Figure 7: Lecture Attendance comparison – Post- Semester Break

As the above data sets (Figures 6 & 7) show, there is a clear pattern of lecture attendance for the four sub-groups. Whereas the students in all the sub-groups attended pre-semester break lectures to similar degrees, the data shows greater variation between pre-and post-semester break attendance for F/Sts and P-/Sts.

Discussion

The quality of student engagement with a first-year education studies unit with the title *Becoming a Teacher* (EDL1000) as measured through lecture attendance and recording 'hits' shows some distinctive patterns. Low attendance rates of F2F lectures, compounded by the neglect to access lecture recordings, stands out as a factor associated with (and maybe even contributing to) low achievement for some of these first year students. Students' time-on-task as measured through attendance of lectures and lecture recording hits was markedly lower for the majority of F/Sts and P-/Sts compared with that of high achieving students in this unit.

Having access to lecture recordings does not necessarily imply automatic and frequent usage of that service. According to the limited, preliminary data available, it seems to be possible to link trends of usage with academic performance (high achieving students are users and low achieving students are non-users). In other words, HD/Sts seemed to have taken the greatest advantage of this service, whereas F/Sts have taken the least advantage of it. The reasons for lecture attendance or non-attendance and choosing to (not) access lecture recordings are unclear. It is clear that the uncertainty about the relationship between users and non-users of lecture recordings and their associated impact (difference in academic performance) necessitates further research.

POLICY IMPLICATIONS

Unsurprisingly, this study showed that intrinsic involvement levels of Gen Y students vary greatly. First-year students who achieved a low Pass (P-/Sts) or Fail (F/Sts) grade and were staying in a unit, completing all assignment requirements were clearly engaged. However, their SCE may not have been sufficient to achieve results that are below or just 'at' the minimum required benchmark to pass the unit. In addition, the implications of semi-engagement may not seem clear to some of these students. ECU, with its promotion of flexible access to study, may need to invest in research that would investigate the price students pay for semi-engagement. Consequently, it is vital for a number of key stakeholders to recognise the importance of tracking student engagement levels to guide policy decision-making on a number of levels. For example, increased monitoring of students' content engagement and lecture involvement could enable the building of capabilities at a micro level for lecturers to gather and share lecture attendance data, and at a macro level, it could mean creating institutional mechanisms for repositories of trend data, which may guide the development of strategic short-term intervention plans, tailored to the specific student profiles and needs. Although a minority, highly engaged, but underperforming students (shown in Figures 6 & 7) may need help with study skills, whereas semi-engaged, low performing students may need help to achieve greater intrinsic motivation for their studies. But, as it seems, all of the low performing students could benefit from targeted intervention, which would help them turn access of flexible learning provisions (lecture recordings) into increased usage of such provisions (ensuring students realise the benefit of lecture recordings). What it cannot mean is to simply blame the students for their engagement. Further investigation is needed to clarify the problem that flexible access brings.

CONCLUSION

A comparison of F2F lecture attendance of the high achievers (HD/Sts and D+/Sts) and the low achievers (F/Sts and P-/Sts) in the first-year teacher education unit *Becoming a Teacher,* as a proxy for student content engagement reveals a striking asymmetry. The correlation between student semi-engagement and academic achievement was measured using lecture attendance data of students achieving low or very low grades (18-53 points) and comparing those to lecture attendance data from students achieving high grades (78-87 points) out of a possible 100 points in one first semester, first year unit.

This asymmetrical student behaviour, especially in regards to lecture attendance and recording usage following the mid-semester break, has potentially great implications for the university. It is inadequate to regard the divide in achievement levels of students as a simple division between those who are deeply engaged with their studies and those who are not. Clearly the matter is complex and more research is needed, even on the nature of lecture attendance and recording access.

As our student demographics are changing, and flexible learning provisions are emerging, lecturers need increased capacities to monitor student engagement levels and learning experiences. While university study becomes more accessible and flexible access is not only desired but demanded by students, there is a need for comprehensive understanding why a group of students may inadvertently or even actively choose to exclude themselves from the possibilities of successful learning through

lecture absenteeism. This research contribute to the awareness of concerns about Gen Y first-year students' engagement levels in two ways: First, it contributes in general ways to emerging conversations about how universities can approach policy decisions brought about by changing societal models of life, work and study patterns of first-year students. Second, this research may invite others to think creatively about the need to develop systematic institutional responses, and avoid simplistic views of students' lack of commitment to study. Unlike students who drop out in the middle of a unit, underperforming students have shown a level of commitment and engagement through their continued enrolment and submission of all assignment requirements that needs to be acknowledged. Thus, they chose to take part in university culture, without perhaps fully understanding what commitment levels this decision entails. At a minimum, it is suggested that low-performing students' intentions be recognised and greater support is given to assist them to become aware of how their choices of semi-engagement influence their performance. Moreover, based on the concern for first-year teacher education students presented in this paper, and, although not yet possessing sufficient evidence to draw hard conclusions, the author's analysis of students' reactions to flexible access to their studies, gives her enough scope to argue that the university has an ethical responsibility to ensure these students make informed decisions about possible consequences of their actions. Collecting evidence about the extent to which SCE measured through attendance/access to lectures affects academic achievements may not be sufficient. Investment into evidence-based intervention programs needs to be made to increase the success rate of low performing first-year teacher education students.

ACKNOWLEDGEMENT

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Living Cases: Authentic Learning in Action

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ABSTRACT

The paper outlines the merit of using case studies in teaching, such as providing real life examples to contextualise theoretical concepts and shifting the emphasis from teacher-centred to more student-centred activities. While there are a variety of case types the material they provide is traditionally static. However, in real life, solutions are affected by changed circumstances reflecting a volatile environment. Hence, the paper reports on the approach of using a 'living' case where students are confronted with teacher-initiated interventions while solving the case. The specific case was that of a university deciding to make, purchase or outsource an Information Technology (IT) project for which students applied techniques taught in the unit. Interventions occurred in three stages and reflected the authentic challenges confronted by an IT professional. The paper reports on students' reactions to the interventions they experienced at short notice, their performance in developing the project case and conclusions that can be drawn on the more sustained learning that resulted from the approach.

INTRODUCTION

Case study teaching is widely practised as it provides clear and demonstrable benefits to both the teacher and the student. For example, the teacher is able to effectively show how knowledge taught is reflected in practice while the student learns through active participation thereby satisfying the proverb of 'involve me and I will learn'. An argument can therefore be made that case teaching provides a highly effective basis for authentic learning.

On closer examination the above premise can be challenged. Case study material is usually provided to students as a package of material, for example a description of the case, which is held constant for the duration of the study, i.e. the semester. However, in real life, solutions are affected by changed circumstances reflecting today's volatile environment. Murray (2007) quotes Mark Rice, Dean of Babson College, as saying that, in respect of case studies, "what you are losing is the rapid fire response that managers are often confronted with in real life. Because in the real world, you don't have 48 hours to respond – you have to be able to think quickly on your feet, aggregate a lot of information quickly, make a decision and take a position."

Hence, the paper reports on the approach of using a 'living' case where students are confronted with teacher-initiated interventions while solving the case. The objective of the research was to gain insight into the student performances when confronted with such case teaching. The empirical aspects of the study were conducted by exploring the nature, challenges and outcomes of case study teaching within a post-graduate Management Information Systems (MIS) unit within the School of Management at an Australian university.

To achieve this aim, an ethnographic approach was taken that is qualitative and in context. As the approach implies, the researcher is an active participant in the program which enables him/her to have studied the phenomenon at close range. Ethnographic research is essentially phenomenological in nature and the researcher constructs a meaning in terms of the situation being studied. Hence, it falls within descriptive/interpretive research paradigm and 'law-like' generalisations cannot be derived

(Remenyi et al, 1998). Nevertheless, the conclusions drawn in this paper should be of interest and value to other lecturers offering or contemplating to offer case study teaching.

NATURE AND TYPES OF CASE STUDIES

Essentially case study teaching is an effective strategy "because of the wealth of practical, real life examples that can be used to contextualise the theoretical concepts" (Davis and Wilcock, 2003). It exposes the student to real life issues and problems. From a pedagogical perspective, it has been shown that case studies shift the emphasis from teacher-centred to student-centred learning (Grant, 1997) and increases student motivation and interest in the subject (Mustoe and Croft, 1999).

Lundberg et al (2001) traced case study teaching back to the 1930s and identified the key objectives during that time as carrying out analysis on information provided, conducting open discussion, and recommending appropriate action. They surmised "that the original intent of teaching cases was to enhance discussion – for appreciation, for understanding, for analysis, and for action – in the service of thinking" (p. 457). During the 1950s it became increasingly clear to them that the nature of information provided for analysis and subsequent discussions had to reflect real life situations to bring the worlds of teaching and practice together.

Savin-Baden (2003, referenced in Davis and Wilcock (2003) highlights the differences between problem-based case learning and project-based case learning and these can be summarised as shown in Table 1. As will be discussed in a later section, the approach used in this study was of the nature of project-based learning.

Table 1: Project-based and Problem-base Case Studies

Project-based Learning	**Problem-Based Learning**
Predominantly task orientated with activity often set by tutor	Problems usually provided by staff but what and how they learn defined by students
Tutor supervises	Tutor facilitates
Students are required to produce a solution or strategy to solve the problem	Solving the problem may be part of the process but the focus is on problem-management, not on a clear and bounded solution
May include supporting lectures which equip students to undertake activity, otherwise students expected to draw upon knowledge from previous lectures	Lectures not usually used on the basis that students are expected to define the required knowledge needed to solve the problem

Besides the above dichotomy, various types of cases can be identified according to format and/or intended learning outcomes (Lundberg et al, 2001). In this study the approach had characteristics of the following types of cases.

- It was primarily an 'application' case. The case "describes a situation in which students can apply some known technique. Such cases typically provide much information, but it may be highly unstructured" (Lundberg et al, 2001, p. 458). As discussed later, students were required to apply the knowledge and skill they had acquired to complete a specific project.
- There were some elements of an 'iceberg' case: "Students are urged to consider what additional information they might like to have and where and how they might be able to get it" (Lundberg et al, 2001, p. 458). As seen later, the information provided was inadequate and students identified additional data required to be able to complete all parts of the assignment.

Case studies involve learning of both unit content and practising key skills. Careful consideration therefore needs to be given as to how to assess these different aspects. James and McInnis (2001) distinguish between two approaches to assessment, namely "developmental ('formative' – concerned with students' ongoing educational progression) and judgemental ('summative' – where the emphasis is on making decisions on satisfactory completion or fitness to progress to the next level)" (p. 5). They go on to observe that the boundaries between the two approaches are not clear cut and that universities have until recently given more attention to the latter than the former. Both are however, entirely legitimate in their opinion. For case studies, a more formative approach is necessary for evaluating key skills development, as different skills are demonstrated during the completion of the case, and ongoing feedback is provided to encourage students to reflect upon their learning experiences.

RESEARCH METHODOLOGY

As stated earlier, the research used a 'living' case approach in which students are confronted with teacher-initiated interventions while solving the case. The objective of the research was to gain insight into the student performances when confronted with such case teaching. In the following sections, the research methodology is described.

Case Material

The material was presented in the form of a project-based case study, designed to meet the criteria as set out in Table 1above. First, students were expected to carry out three task set out for the assignment (see below) by the lecturer. Second, they had to produce specific 'deliverables' for each of the three parts. The lecturer exercised supervision by proving feedback and direction for each part (see role of instructor below). Furthermore, the students were taught the knowledge and skill to complete the tasks by using two methodologies, namely 'Active Benefit Realisation' (ABR - see Remenyi et al, 1997) and 'Value from IT' (VALIT – see ITGI, 2006). In addition, not mentioned in Table 1, the assignment had a normative focus (Cappel & Schwager, 2002) since the case outcome was future rather than past orientated (i.e. developing project material) and required opposing views about the problem to be expressed (e.g. evaluating alterative solutions) by different actors (i.e. students).

The case material was titled "Make, Source, or Buy: The Decision to Acquire a New Reporting System", published by Ross et al (2006) in Journal of Cases on Information Technology. It outlined the needs of The College of Business (COB) of Northern Washington University (NWU) for a number of information systems. They are confronted with decision processes and options on implementing five systems. The assignment required students

> "to analyse the case and provide a report (in three parts) to the Dean of COB with the following title: The Business Case for the IS investment. You should identify the issues in the case study that have relevance to a business case and produce a business case as best as possible from the information available. Use headings you deem appropriate by referring to the material (e.g. ABR, VALIT) covered in the unit. Submit your report in the following parts:
> - Part1: The "why" stage: reasons for investing in the information systems.
> - Part 2: The "what" and "which" stage: identify the options available, analyse them and determine the best option.
> - Part 3: The "how" stage: outline the implementation activities for the option you recommend in Part 2.
>
> When put together the whole report should reflect a professional standard and be between 2400 and 2600 words long."

Case Completion

The study objective, as stated earlier, was to gain insights from conducting a 'live' case study. Participants were students in a small (11 students) postgraduate unit in the Faculty of Business at an

Australian university. They had not experienced this before as case study assignments completed previously were static in that the case material was provided in text form and remained unchanged for the duration of the semester.

The design of completing the case study was based on the 'cognitive' dimensions of Henri (1992) and the 'reflective thinking' types of Mezirow (1991). The former includes elementary clarification, in-depth clarification, inference, judgement, and strategies while the latter is about content reflection, process reflection and premise reflection. The dimensions provided two criteria against which the learning activities (e.g. analysing, solving) in case learning were chartered as shown in Table 2. It shows how the first step in studying a case involves understanding of content which requires both elementary and in-depth clarification. This is followed by the processes of analysis and solving the problem requiring inference and judgement. Finally, premise reflection is required to recommend strategies for implementing actions for the case under review.

Table 2: Dimensions of Case Learning

Cognition /Reflection	Content	Process	Premise
Elementary clarification	Understanding ↓		
In-depth clarification	Understanding ↓		
Inference	→	Analysing ↓	
Judgement		Solving ↓	
Strategy		→	Recommending

The assignment was deliberately designed in three parts in order to increase the authenticity of student learning. **Part 1** required students to carry out a high level strategic analysis justifying the need for investing in new Information Systems (IS) at NWU. The teaching objective was to provide an understanding of the case itself before completing the more extensive parts 2 and 3. Understanding was assessed by conducting a subsequent classroom discussion. As observed by Ellis et al (2004) "Learning through discussion or conversations is a fundamental part of teaching and learning" (p. 73). In essence, discussions help to provide foreground to learning leading to a deeper engagement by the student with content thereby affecting conceptual change (Ellis et al, 2004).

Part 2 was designed to get feedback on the progress of analysing the case. During this period, students were requested to complete a short questionnaire which explored the difficulties that they may have been experiencing. Student opinions were sought about the newness of knowledge, deadlines, other commitments and complexity. For **Part 3**, students were instructed to recommend activities, via email to the instructor, which would enable the project to be implemented.

Instructions and Assessment

As lecturer, two roles were played. First, to satisfy the objective of providing an authentic learning environment, the lecturer provided direction to the project in various capacities. For part 1, the role was that of a senior manager who is responsible for strategy. In this role, additional data was provided to enable students to complete part 2. For part 2, the role of IT project manager was adopted since the completion of the analysis activities was the most time and resource intensive of all case activities. For part 3, the role of senior management was again adopted since students were requested to recommend activities that should be completed to implement the project and an edict was issued to proceed with the outsourcing option.

The second role was that of teacher. This role in case learning should not be underestimated since knowledge transfer tales place when students and teacher interchange ideas. According to Stange (2005), the role of the instructor in an advice-giving context involves both the intellectual (e.g. high-

level knowledge, exceptional understanding, exceptional judgement) and interpersonal domains (e.g. sensitivity, compassion, empathy), and should reflect experience. In effect, the advisor is being relied upon to provide insights that differ from those of the students, thereby supporting the multi dimensional nature of case studies.

Regarding assessment, this is an important tool for the educator for the key reason that it can be effectively used to enhance students' learning and it provides a measure of learning. It becomes even more important when considering the student's perspective. "Assessment literally defines the curriculum for most students – by spelling out the learning that will be rewarded, it is a potent strategic device for educators." (James and McInnis, 2001, p. 4) In this study, formative assessment was applied for the purpose of improving learning and student performance as discussed earlier.

The following table summarises the research methodology reflected in the discussions above.

Table 3: Summary of Research Methodology

Case Design	Data Collection	Instructor as Business Person	Instructor as Educator
Part 1: Understanding	Assessment + subsequent class discussion	Senior Manager	Increase understanding
Part 2: Analysis	Short questionnaire + subsequent assessment	IT Project Manager	Provide context
Part 3: Recommendation	Email + subsequent assessment	Senior Manager	Provide context

Table 3 shows the objectives of the three parts of the case study assignment and associated methods of data collection and the roles played by the instructor. For example, in part 1, a class discussion took place following the assessment. The professional role performed was that of a senior manager while as an educationalist, the objective was to provide greater understanding to students on how to complete the subsequent activity, namely the analysis of the case study.

FINDINGS

Part 1 (Understanding)

Following submission of part 1 (the 'why' stage) of the business case, it became clear to students that insufficient financial data was originally available to evaluate the three options being considered in the decision to acquire a new reporting system. The class discussions that took place aimed at establishing student's understanding of the situation they had encountered. In real life, IS professionals often are confronted by incomplete data or information.

- Recognising missing data. Students indicated that they had quickly realised that the data was "not balanced" and that " key cost items were missing."
- Effects on completing part 1. They felt "uncomfortable" when submitting part 1 because of the missing data and felt only "70% confident" with the work they had submitted. The "need for more data" was strong.
- Situation in real life. Students suggested that they would "request more data and rework" this part of the assignment. If not available they would "make assumptions" but this would reduce their confidence in the work done.
- Benefits of additional data. When offered additional data, they felt that this would "make a difference" and be "very helpful".

Students were therefore informed that

> "Hence, the COB at NWU has provided a summary of financial data already available as well as additional data. This data, together with much information on non-financial costs and benefits provided in the case study material, should be used in part 2 (the "what" and "which" stage) of the business case to carry out a cost-benefit analysis (e.g. ROI, Payback) for each of the three options."

Part 2 (Analysis)

This part was the most extensive one, worth 50% of the assignment, since it involved the "what" and "which" stage in which student identified the options available, analysed them and determined the best option. To gain insight into the progress of completing the analysis, the following email was sent.

> "The project sponsor in NW University has heard rumours that the business team evaluating the three options for the COB reporting system may be struggling to complete part 2 (the "which" stage) of the business case. He has therefore asked you to respond to the following questions. Would you like an extension of the deadline for submitting part 2 by one week? Answer "Yes" or "No" If the above answer is "yes" rank the following reasons from 1 to 6 where one is the most important reasons and 6 the least important. Each item must have a number between 1 and 6 to indicate its importance to you."

An analysis indicated the following ranking:

1. The deadline after the submitting part 1 of the business case is too soon;
2. Other commitments are also requiring my time;
3. The knowledge to prepare part 2 is very new to me;
4. I need feedback before submitting;
5. The case study is complex and not easy to solve.

Part 3 (Recommendations)

The following email to students summarises the findings of this part.

> "As requested, I received 9 emails suggesting items to be included in part 3. However, quite a few of the suggestions are not relevant as they do not relate to realisation activities. For example, producing initial pictures (ABR) is part of ex ante activities but updating pictures is part of the realisation process. From the list the clear winner was forming and using a stakeholder group. Second was continuous evaluation of costs/benefits of the IT investment as it is being developed, i.e. formative and participative according to ABR. Third was change management as per VALIT. Other valid suggestions included monitoring metrics, implementing governance structures and upgrading the business case. As agreed, you should now develop part 3 via the above headings (stakeholders, continuous evaluation, change management) in respect of the case study."

DISCUSSION

To recap, the objective of the study was to provide a case study project for students that was as authentic as possible. To achieve this within the constraints of teaching (e.g. completion over the period of one semester) the case study was designed in three parts, each presenting the student with an experience that he/she may encounter in the business world.

The feedback provided to students for **Part 1** showed that marks ranged from 45% to 90% and was summarised in the following statement: "This strategic part of the business case was generally well prepared. However, the following are comments for improvements as observed across the papers." While the students readily recognised the absence of key financial data (see findings section) there were weaknesses in recognising more sophisticated issues that would impact on the strategic decision whether or not to go ahead with the IT investment. They were primarily in respect of non-financial benefits and costs (often referred to as intangibles and difficult to measure), risks and organisational impact. A further observation was that even though some information was not stated explicitly, inferences could be and should have been drawn from the case material.

Part 1 was about the "understanding" dimension of case learning (see Table 1). The findings showed limited understanding of the class about the many issues that impact on strategic decision-making. This is where the role of the instructor became important in that he/she is able complement student's knowledge and experiences with those of the instructor. By increasing the level of understanding of the case itself, the subsequent parts of the case would be completed more satisfactorily. As stated in the earlier discussion, the advisor is being relied upon to provide insights that differ from those of the students, thereby supporting the multi dimensional nature of case studies.

The summary comment provided by the lecturer for **Part 2** was as follows: "This part of the case study was very well completed reflecting a good understanding of theory and how it can be applied to a real life situation. The high standard is reflected in the marks: 95%, 90%, 85%, 80% (x6), 70%, 40%. Well done all!" As seen in the findings section above, students appeared to complete this analysis phase of the case study fairly comfortably since they did not believe that the case was complex and difficult to solve. However what they requested was more time, most likely to enable them to provide a thorough analysis. The good results achieved indicated that they had acquired the prerequisite content knowledge to carry out the analysis. This finding was somewhat unsurprising as the two methodologies (ABR, VALIT provided well laid out and structured guidance on how to analyse the case.

Marks for **Part 3** ranged from 55% to 85% and the comment was made that "The main feedback is that assignments generally provided good practical suggestions for the 'how' aspect of benefit realisation while supporting theory was sometimes lacking. If you refer back to the assignment requirements, they indicate that knowledge of ABR and VALIT should be demonstrated in solving the case study." In this part students had to identify and select from a range of activities contained in the methodology materials. There was no structure or guideline to be followed but items selected required justification for their inclusion. Similar to part 1, this task was less well done and required the overview of the lecturer to put various options into the perspective, i.e. into context of the case itself.

CONCLUSION

The first conclusion that can be drawn is that student experiences increased with a living case as shown by the diversity of tasks, the outcomes and ongoing feedback they received. For the 'usual' static approach, experience to learn from the case study would be limited to a summative type of assessment. The emphasis on formative assessment with a 'living' case supports constructivist cognitive thinking where students learn to learn as they learn. This is experiential learning where "experience acts as a transformational process which brings about learning – and that experiential learning is based on process – not mere outcomes." (Taylor and Clemans, 2000, p. 264)

Second, the crucial action of constructing meaning is mental. It should be recognised that students acquire declarative knowledge (e.g. from textbooks) but also require procedural knowledge (e.g. experience) in applying the former. As discussed above, declarative knowledge was well demonstrated in part 2 of the assessment but procedural knowledge was lacking in parts 1 and 3. This is where the role of the lecturer becomes vital, both as teacher and as business professional. Feedback was essential

to maximise understanding and acting in various capacities (i.e. senior manager, IT professional) provided authenticity in student learning.

Third, the living case approach appeared to sustain the interest and, more importantly, the motivation of students. They were encouraged to probe for feedback and engage in reflections with the lecturer on their experiences. Motivation is key to learning. The student's real motivation needs to be established in order to have effective learning. They are largely behavioural and are thus not easily determined. However, by making the case more interactive and dynamic, levels of learning seemed to have been sustained throughout the semester.

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The Teacher – Technology Balance in Business Case Teaching: A Student Perspective

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ABSTRACT

This research investigated students' preferences for completing business case studies online compared to face-to-face. The research model was based on the 'cognitive' dimensions of Henri (1992) and the 'reflective thinking' types of Mezirow (1991) against which the activities in case learning were charted. Data was collected through a questionnaire involving postgraduate business students. The findings indicated that, to gain understanding of the case, students prefer material in multimedia form but overall the physical approach was preferred, particular the use of class discussions. When analysing and solving the case problem, the physical and online approaches were more balanced. When developing recommendations, students valued the importance of face-to-face feedback as well as online comparison with the work of others. Responses indicated that students would be willing to provide elementary clarification of the case material to other students online but less willing to provide reasons for critiquing the work of others. The study provided an indication that the blended approach to case teaching in business studies may be the preferred option for students. This would enlarge their learning space as well as develop an e-learning community. As a result student learning is sustained.

INTRODUCTION

Case studies have been used over many years in tertiary teaching. The key reason is that they provide the opportunity "to reduce the divide between simulation (teaching) and reality (practice)" (Hackney et al, 2003, p. 229). In other words, it is an effective teaching and learning strategy to bring the real world into the classroom. The internationally renowned Harvard University has over many years encouraged this type of education in their class rooms. With the rapid advance of Information Technology (IT), and in particular the World Wide Web (web) on the Internet, the opportunity exists to offer and conduct this type of education beyond the physical classroom. While the attraction of using technology in education appears obvious at first glance (for example, it offers convenience to students when and where to participate in solving the case), it also seems that benefits of the interplay between students and teaching staff will be reduced.

The objective of this research was to gain insights into the preferences students have for completing case studies either by physical interactions with their lecturer and fellow students and/or online. Insights gained will enable the teacher to be more effective in blending his/her role with appropriate technology in achieving an effective case learning outcome.

CASE STUDY TEACHING

Lundberg et al (2001) traced case study teaching back to the 1930s and identified the key objectives during that time as carrying out analysis on information provided, conducting open discussion, and recommending appropriate action. They surmised "that the original intent of teaching cases was to enhance discussion – for appreciation, for understanding, for analysis, and for action – in the service of thinking" (p. 457). During the 1950s it became increasingly clear to them that the nature of

information provided for analysis and subsequent discussions had to reflect real life situations to bring the worlds of teaching and practice together.

There are a number of critical elements that should be covered in case study teaching. First, as identified above, it should bring the real world into the classroom, 'warts and all'. The real world is messy, poses dilemmas and may offer a number of possible solutions to problems. This requires careful analysis in which the student is required to understand the specific context of the case, gain a sense of boundaries relating to the problem situation and be sensitive to interrelationships that occur in the case. Barnes et al (1994) (referenced in Lundberg et al, 2001) identified these as three of six critical elements of a teaching case, the other three being examining the case from a multidimensional point of view and integrating dimensions with the view of offering a solution to the problem, taking personal responsibility for the solution (for example, the student may have to wrestle with social values and ethical issues), and being action orientated, i.e. to be of practical value.

The overriding teaching philosophy is one of learning by doing. By participating in analysis and discussion, the proverb of 'involve me and I will learn' is being followed. Problem based learning (PBL) emphasises the understanding of concepts and critical thinking; it bridges the theory-practice gap by encouraging learning in context. As pointed out by Ahlfeldt et al (2005), the approach had its origins in medicine but is now practised in many disciplines, including business. "PBL involves confronting students with a problem related to the class material opposed to traditional dialectic approaches to education" (p. 9). This provides a 'loosely-structured' situation in which students are able to explore and learn. A shift occurs from teacher to student. Ahlfeldt et al (2005) found that PBL works best in higher-level classes and classes with fewer students as was the case with this research (see later section).

The role of the teacher, however, should not be underestimated since knowledge transfer tales place when students and teacher interchange ideas. According to Stange (2005), the role of the instructor in an advice-giving context involves both the intellectual (e.g. high-level knowledge, exceptional understanding, exceptional judgement) and interpersonal domains (e.g. sensitivity, compassion, empathy), and should reflect experience. In effect the advisor is being relied upon to provide insights that differ from those of the students, thereby supporting the multi dimensional nature of case studies.

TEACHING CASE STUDIES ONLINE

Murray (2007) provides some insight into the reasons why the Boston-based Babson College is advocating teaching cases on the web. The major advantage is seen as increased student participation. The classroom experience of many academics has been the reluctance of students to be active discussants for reasons such as lack of language proficiency and/or confidence and cultural. Some students can be quite vocal and dominate discussions. Electronic forums provide the opportunity to think about the contribution the student wants to make and to do so with confidence. In this way discussions are increased since more students are prepared to contribute.

Online discussions furthermore are not restricted to the duration of the class but continue because students stay electronically connected. The use of online chat rooms, discussion boards and email has enabled students to allocate tasks among themselves if they wish, see and comment on the work of others, and exchange ideas at a time of their convenience. The web has also enabled the case material to be presented in a rich format. Murray (2007) draws attention to the Warwick Business School where electronic case studies are presented in multimedia format, including audio, video and links to websites.

There are however two major issues with the use of online case study teaching. First, the approach to solving the case may not reflect real life business. Murray (2007) quotes Mark Rice, Dean of Babson College, as saying "what you are losing is the rapid fire response that managers are often confronted with in real life. Because in the real world, you don't have 48 hours to respond – you have to be able

to think quickly on your feet, aggregate a lot of information quickly, make a decision and take a position." From a student learning perspective this may, however, not be desirable as it may result in surface rather than deep learning. Under surface learning, students get work done as fast as possible, using low cognition activities, while with deep learning, students engage with a task meaningfully and, what McCombs (2000) refers to as real life learning. "Real life learning is often characterised as playful, recursive and non-linear, engaging, self-directed, and meaningful from the learner's perspective" (p. 1).

The second concerns the discipline itself and the role of the instructor. Business, being part of social sciences, is a low consensus discipline (Feldman, 1987) based on application of softer and more transient knowledge (Lindsay, 2002). It is therefore not possible to provide 'correct' solutions to the case analysis; different approaches will lead to different outcomes. This may not suit the student seeking a model answer and hence the role of the instructor in involving him/herself online to put the case into context becomes even more important.

RESEARCH METHODOLOGY

The study objective, as stated earlier, was to explore students' attitudes towards learning from case studies in a face-to-face and/or an online mode.

Research Model

The research was based on the 'cognitive' dimensions of Henri (1992) and the 'reflective thinking' types of Mezirow (1991). The former includes elementary clarification, in-depth clarification, inference, judgement, and strategies while the latter is about content reflection, process reflection and premise reflection. The dimensions provided two criteria against which the learning activities (e.g. analysing, solving) in case learning were charted as shown in Table 1. It shows how the first step in studying a case involves understanding of content which requires both elementary and in-depth clarification. This is followed by the processes of analysis and solving the problem requiring inference and judgement. Finally, premise reflection is required to recommend strategies for implementing actions for the case under review.

Table 1: Dimensions of Case Learning

Cognition /Reflection	Content	Process	Premise
Elementary clarification	Understanding ↓		
In-depth clarification	Understanding ↓		
Inference	→	Analysing ↓	
Judgement		Solving ↓	
Strategy		→	Recommending

Research Material

Participants in the research were students in a small (11 students) postgraduate unit in the Faculty of Business at an Australian university. They had completed a case study during the semester entirely in a 'physical' manner. In other words, the case study assignment was classroom based in that the material was provided in text form, discussions took place in class, consultations with the lecturer were face-to-face as were discussions between students since no online forums were offered. As far as the researcher could establish participants had not experienced online case learning during their studies to date.

The research required students to complete a questionnaire in which students expressed their opinions on a rating scale and had the opportunity to provide written comments against each variable. There were three sections:

1. Part 1: the degree of preference (or lack of it) of changing from classroom to an online learning mode (12 questions),
2. Part 2: the importance of features within the physical and online approaches (13 questions), and
3. Part 3: the degree of willingness to participate in online activities (5 questions).

A copy of the questionnaire is provided in the appendix.

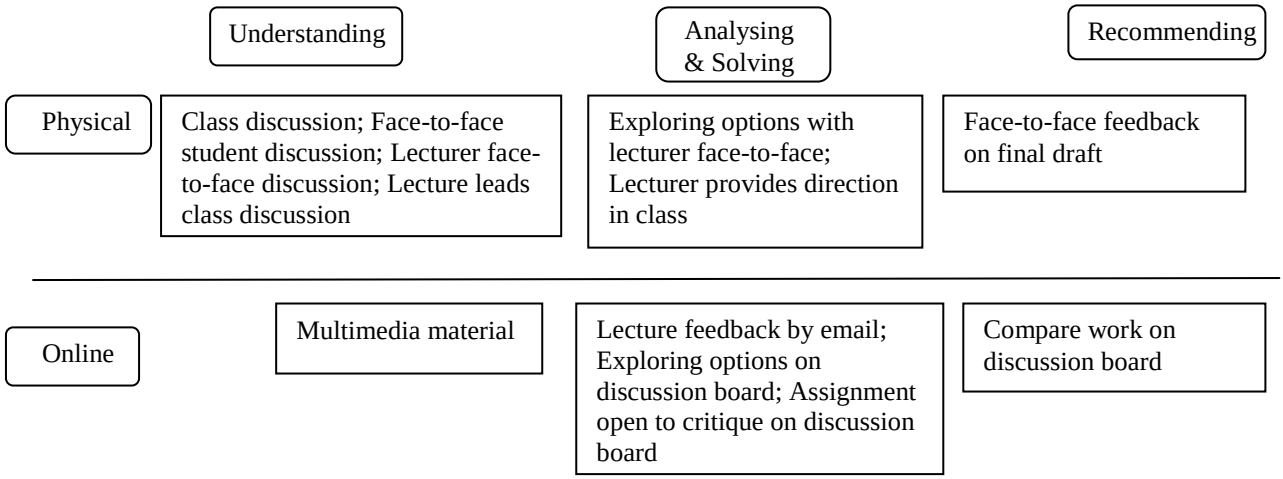
Data analysis

Numerical data was analysed using descriptive statistics, i.e. mean ratings for each of the 30 research questions. More sophisticated analysis was not possible because of the small sample size (see discussion of research limitations in a later section). The written comments were scrutinised by the researcher for the purpose of seeking reasons behind the ratings.

FINDINGS AND DISCUSSION

Research variables with the highest ratings were identified and are presented in Figure 1. The diagram has two parts - the physical approach to case study learning above the horizontal line and the online approach below the line. There are three sections indicating the case learning activities as set out in Table 1 with rectangles indicating preference between physical and online approaches.

Figure 1: Student Preferences



The findings indicated that to gain understanding of the case, students prefer material in multimedia form which includes online approaches such as accessing websites and video clips. Overall, however, the physical approach was preferred, particular the use of class discussions in which the lecturer provides the lead, and face-to-face interactions between students and the lecturer take place. Qualitative comments confirmed the importance of physical contact with peers and the lecturer. Generally students felt that the physical approach provided "better understanding", was "much more valuable" than online discussions, facilitated "direct involvement" and furthermore online discussions "take too much time". The findings confirm those of Ellis et al (2004) "Learning through discussion or conversations is a fundamental part of teaching and learning" (p. 73). In essence, discussions help to

provide foreground to learning leading to a deeper engagement by the student with content thereby affecting conceptual change (Ellis et al, 2004).

When analysing and solving the problem, the physical and online approaches were more balanced. Students preferred having the opportunity to explore options with the lecturer face-to-face and learning from him/her when he/she was giving direction in class to ensure that assignments were on track. However, the convenience of online was attractive through the use of email to obtain feedback, and using the discussion board to explore options in solving the case. In addition, students were open to having their evolving assignments critiqued online by other students, thereby gaining the benefit of greater student participation.

When developing recommendations, students valued the importance of face-to-face feedback as well as online comparison with the work of others. This indicated that ensuring the quality of the submission was regarded as important. The important effect that assessment has on student learning has long been recognised. Biggs (2004, p. 140) quotes Ramsden (1992, p. 187) "From our students' point of view, assessment always defines the actual curriculum." Biggs (2004) terms this as "backwash", "when the assessment determines what and how students learn more than the curriculum does. In a poorly aligned system, where the test does not reflect the objectives, this will result in inappropriate surface learning" (p. 140). According to Biggs (2004) backwash should be positive or as Winn (2002) suggest, for students who focus on assessment, the assessment is designed so that students learn from that. In case learning, achieving quality outcomes enhances the skills required as outlined earlier such as adopting a multi dimensional perspective, bringing values into play, etc.

The third section of the questionnaire requested students to indicate their willingness to participate online. Responses indicated that students would be prepared to provide elementary clarification of the case material to other students online but to a lesser degree for indepth clarification. While assessing other students' work was rated in the mid scale, the lowest rating was for providing reasons for such assessments. This appears to be in contrast to the desirability of having the evolving assessment critiqued online, thereby gaining the benefits of improving the quality of submission, as outlined in the earlier section.

CONCLUSION

This research provided an indication that the blended approach to case teaching in business studies may be the preferred option for students. In other words, the notion that one approach is better than the other is too simplistic. Students indicated that their learning space can be enlarged through the introduction of online technology and indicated some preparedness to become an e-learning community. It was clear that a start could be made by using technology to enrich the case material and interaction but keeping the physical interaction to maximise the understanding of the case itself.

It should be acknowledged that the research was exploratory in nature to get a first indication of students' attitudes to business case learning in two different modes. The small sample size was caused by the nature of the class itself, i.e. a postgraduate business unit. Such units are typically small in size. Because of this, findings and conclusions cannot be generalised. The results, however, have provided the researcher with the incentive to improve his approach to case teaching in the following semester. Furthermore, the research model itself, using the dimensions of cognition and reflection, can provide the basis for future research, for example by repeating the study in units that also use case teaching.

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APPENDIX: Students' Attitudes to Completing Case Studies Online

Part 1

This part asks you to evaluate the change from completing case studies in class (physical) to completing case studies online (virtual).

Please rate your opinion as to **your preference** for changing to an online mode on the scale provided (1 to 5 – **circle** one number) and make **one** brief comment (key words or phrase) against each item.

From (physical) →	**To (virtual)**	**Your Preference**	Your comment (make at least **one** comment against each row)
		Not preferable 1 2 3 4 5 Very preferable	
The case material			
In document form	In multimedia form (e.g. text supported by video clip)	1 2 3 4 5	
Understanding the case material			
Discussion in class	Asynchronous discussion on discussion board	1 2 3 4 5	
Discussion between students face-to-face	Synchronous online chat with other students	1 2 3 4 5	
Discussion with lecturer face-to-face	Discussion with lecturer by email	1 2 3 4 5	
Lecture leads class discussion	Lecturer periodically moderates online discussions	1 2 3 4 5	
Solving the case study			
Feedback from lecturer face-to-face	Feedback from lecturer by email	1 2 3 4 5	
Exploring options with lecturer face-to-face	Exploring options with lecturer by email	1 2 3 4 5	
Exploring options in class	Exploring options on discussion board	1 2 3 4 5	
Lecturer provides direction in class	Lecturer moderates discussions on discussion board	1 2 3 4 5	
Evolving assignment is kept confidential from other students	Evolving assignment is open for critique by other students via discussion board	1 2 3 4 5	
Ensuring quality of solution			
Face-to-face feedback on final draft by lecturer	Email feedback on final draft by lecturer	1 2 3 4 5	

Not able to compare my work with those of others	Able to compare my work with those of others via discussion board	1 2 3 4 5	

Part 2
This part asks you to rate the importance to you of the physical and virtual approaches to completing case studies. **Circle** one number and make **one** brief comment (key words or phrase) against each item.

	Not important				Very important	Your comment
Physical approach to case study assignment						
Lecturer provides direction in class	1	2	3	4	5	
Lecturer provides feedback face-to-face	1	2	3	4	5	
I know immediately if assignment is on track	1	2	3	4	5	
Able to verify quality of final draft directly with lecturer	1	2	3	4	5	
Assignment details kept confidential from other students	1	2	3	4	5	
Additional resources are recommended by lecturer	1	2	3	4	5	
Online approach to case study assignment						
More students participate in solving the case	1	2	3	4	5	
Online participation is at convenient times	1	2	3	4	5	
Multimedia material provides richness of information	1	2	3	4	5	
Online discussion among students generates ideas	1	2	3	4	5	
Able to compare my work with those of others	1	2	3	4	5	
Feedback is received from multiple perspectives	1	2	3	4	5	
Additional resources recommend by other students	1	2	3	4	5	

Part 3
This part asks you to indicate your willingness to be part of completing case studies online.
Circle one number and make **one** brief comment (key words or phrase) against each item.

	Not willing				Very willing	Your comment
Spending time participating online	1	2	3	4	5	
Providing elementary clarification of case material to other students online	1	2	3	4	5	
Providing in-depth clarification to other students online	1	2	3	4	5	
Assessing the work of other students online	1	2	3	4	5	
Providing reasons for assessment of work of other students online	1	2	3	4	5	

End of questionnaire – Thank you for participating

Fulford, R., Edith Cowan University, Australia

Educating Using an Information System as a Cognitive Tool

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ABSTRACT

This paper discusses the effective education of internal and external students, concerning business processes and principles, using an enterprise resource planning application as a cognitive tool. The teachings explain a number of core business principles and develop students understanding of how the processes might vary between organisations in differing industries and environmental settings.

The students establish the processes in an enterprise resource planning application, which reinforces the understanding of both operational activities and business management requirements. A cohort of students has been surveyed; the findings demonstrate that education using an enterprise resource planning application as an interactive learning system is both practical and beneficial. The following explains the teaching environment and discusses the survey results.

INTRODUCTION

This study concerns the education of a unit (semester teachings of a subject) that concerns business operation processes and implementation practices of an enterprise resource planning (ERP) application. The unit explains the business principles and then develops the students understanding into a comprehensive framework that enables them to identify how to implement an ERP application in different types of organisations. The aim is to provide universal outcomes by educating, rather than training, with an information system.

The unit utilises the Microsoft Dynamics (AX) ERP application as the teaching vehicle. Edith Cowan University was the first university in the Southern Hemisphere to enter into the Microsoft Academic Alliance and to utilise the Dynamics suite of systems for education purposes. The teaching outcome prompted the decision to use Dynamics AX, as the previous application, SAP ERP, had not sufficiently facilitated student conceptualisation of business processes. The unit had been successfully taught using Dynamics AX as an internal unit for two semesters prior to being offered as an online unit. This paper first explains the teaching philosophy and processes of educating using ERP as a cognitive tool. It then presents the result of a survey of 74 students.

COMPUTER TECHNOLOGY

ERP applications are core software used by organisations to coordinate information in every area of business. They help to manage company-wide business processes, using a common database and shared management reporting tools (Monk & Wagner, 2006). The salient and identifying characteristic of ERP systems is their ability to integrate business processes by standardising data and ensuring that this data is accessible to whoever needs it on a real time basis (Strong, Volkoff, & Elmes, 2003). Organisations may adjust their way of working to fit the package (Markus, Tanis, & Van Fenema, 2000), although, most implementations are a mixture of existing ERP processes and customised processes that meet specific organisational requirements.

The Microsoft Dynamics (AX) application utilises the Microsoft SQL-Server or Oracle database systems. The university PCs situated in laboratories operate as, what is termed, 'fat clients', that is to say they pass relatively large quantities of data and functions between the PC and a Server. Internal and external students can access the ERP application remotely, using, what are termed, 'thin clients'. Thin clients require minimal installed functions, with data and programs being passed between the students PC, at work or home, and the server.

This was achieved by installing the Microsoft Dynamics AX Application Object Server (AOS) which provides functions to the remote PC as required. The establishing of the AOS is a relatively simple matter, however, it required changes to the university firewall which is a procedural matter and, surprisingly, onerous. When using the application external students experience very similar responses to on campus students. The application topology is shown in figure 1.

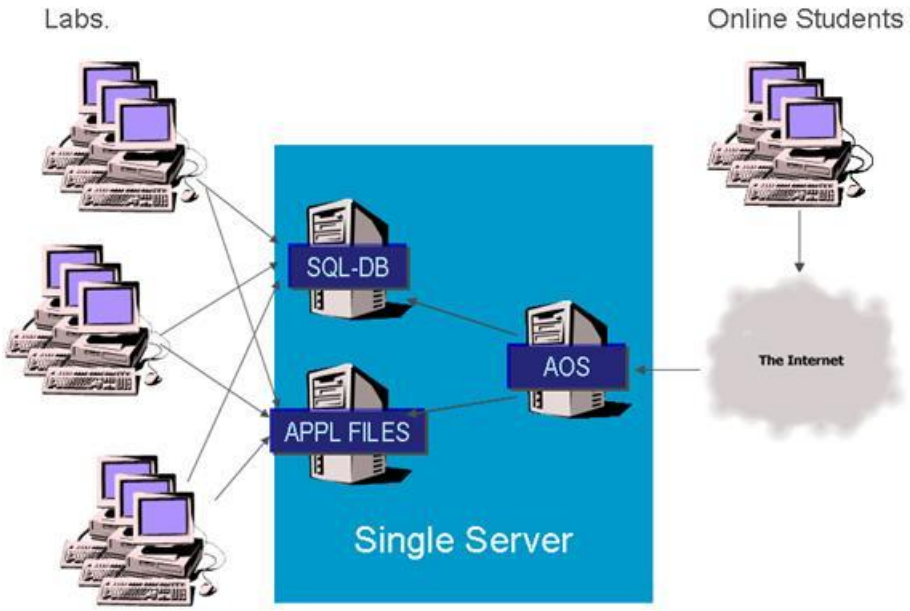


Figure 1: Computing Topology

Herrington and Oliver (2000) found that for many students a situated learning framework is not practical with computer-based learning. However, the ease of establishing the ERP educational environment along with the current extensive use of Broadband Internet access demonstrates that this might no longer be the case.

TEACHING PHILOSOPHY

The aim is to provide an education experience for students that enables the students to relate the setup of an ERP application to the nuances of organisations, and for that experience to provide valuable transferable knowledge. The ERP application acts as a cognitive tool, which empowers students to design their own representations of knowledge (Reeves 1999). The teaching philosophy has its roots in the cognitive domain of Bloom's taxonomies of human learning, where students gain the ability to analyse, synthesise and apply. The aim is to foster critical thinking and to enable students to understand that there is not necessarily a correct answer to business matters, but an array of possibilities with risks, advantages and disadvantages associated with them. The teaching environment enables students to comprehend at different speeds and in varying ways, providing an educational outcome of "deep learning" (Chapman et al., 2005).

The extent of ERP functionality and the diversity of the organisations they support creates a number of complexities for teaching; (1) a student requires some knowledge of business functions, including financial procedures, sales, procurement, inventory control and production, (2) without broad analysis and examples students may become prescriptive about business process and implementation principles, (3) students might associate with the application rather than the implementation and business processes.

These difficulties are perhaps more easily supported with on-campus learning than online studies, particularly because of the inherent difficulty of educating, rather than simply informing, external students (Herrington, et al., 2005). To mitigate these problems the students develop understanding through establishing and varying the ERP representation of organisations. Difficulties and lack of knowledge quickly become apparent through the learning activities and are readily resolved by dialogue and remote demonstration of how to properly establish the business processes. Education material focuses on the processes and principles rather than the application.

TEACHING METHOD

Students can learn "from" interactive learning systems and programs and "with" interactive learning tools (Reeves 1999). The unit discussed here uses both of these approaches. The "from" is facilitated by the learning management system Blackboard academic suite (Blackboard, 2008), which allows students to access videos, lecture slides, lecture recordings and lab. materials. Some of the videos are Microsoft promotional videos that discuss the attributes of the application and the types of organisations that have implemented the application (Giant bicycles is an example). Other videos are edited exerts of the Australian television program Business Success, which explains some of the features of the application and the benefits to organisations. Lectures are recorded in MP3 format and placed on Blackboard. Signposting is used during the lectures to identify slides and to explain questions so that external students are aware of what is happening.

The "with" is facilitated by the Microsoft Dynamics AX ERP. Students login to the application and establish a trading company. The application does not initially contain any data or parameters, and the students must establish every aspect of the company. The students create a chart-of-accounts, financial periods, customers, suppliers, inventory components, bills-of-materials, production routes, and associated financial posting parameters. The lectures explain the business principles and how they might differ between organisations. For example, how organisations may manage the production environment if it were upstream or downstream of a supply chain push-pull boundary. The ERP is used to narrow the potential void in university education between theory and practice identified by Herrington & Oliver (2000).

The unit uses assessment to reaffirm learning and requires that students alter the processes that they have implemented. The assessments explain business requirements that are different to the ones that are created in the lab. activities, the students must vary the underlying setup of the application to support the new requirements. This requires a clear understanding of organisational processes and how to establish an ERP to represent those processes. The lecturer is able to access each of the students companies to check on progress and advise students. Student support for assignments is limited and, therefore, students have to revisit the labs. to understand what is required.

The assessments are formative, which ensures that students are coping with each aspect of the increasingly complex process. Assessments are marked and feedback given via screens added to the application. Figure 2 shows a screen used for marks and feedback for the first assignment. If there are problems with the assignments, students must resolve them prior to continuing with their studies. This creates the combination of authentic context, authentic activity, and authentic assessment that leads to enduring knowledge (Herrington & Oliver, 2000).

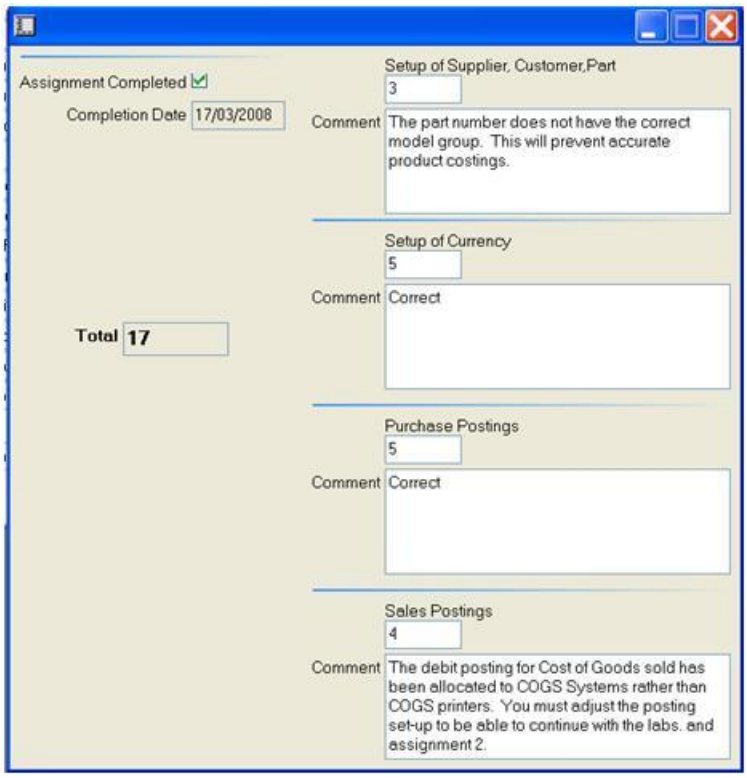


Figure 2: Assessment Screen

An example of the detailed discussion that students find helpful is the examination of the accounting function early in the unit. The lecture material identifies principles of accounting. The lab. activities establish, in the application, a general ledger, customers, suppliers and posting criteria for sales invoices and receipt of purchase invoices. These transactions help the students identify how financial postings work in a business and how information systems (IS) facilitates that process. The lectures then broaden the discussion and explore the granularity of information in a general ledger; identifying how to capture sales and costs by region, product ranges and other categorisations.

One of the assignments has students alter the configuration of their company to post financial transaction with a greater level of detail and with different attributes, enabling their organisation to be analysed from different perspectives. This helps students not only understand how the different modules interface but how to vary the interface to meet business requirements. The application then becomes a cognitive tool that supports the deep reflective thinking that is necessary for meaningful learning (Reeves 1999). Financial ratios, which have been learned in previous units, are re-examined and students have expressed that, for the first time, they have had a clear understanding of the aims of the ratios.

A text book could not be identified that sufficiently supported the educational aims. Weekly readings are provided from books, journals and other articles. A comprehensive study guide has been created that includes lecture material, lab. activities and explanation of business processes. The business processes in the study guide include examples of outcomes: two examples are ABC (Perito) stock classifications, and actual versus standard costing methods. The book is available on Blackboard as Pdf files and can be purchased via the university bookshops for a nominal fee that is aimed at recovering production costs.

STUDENT SURVEY

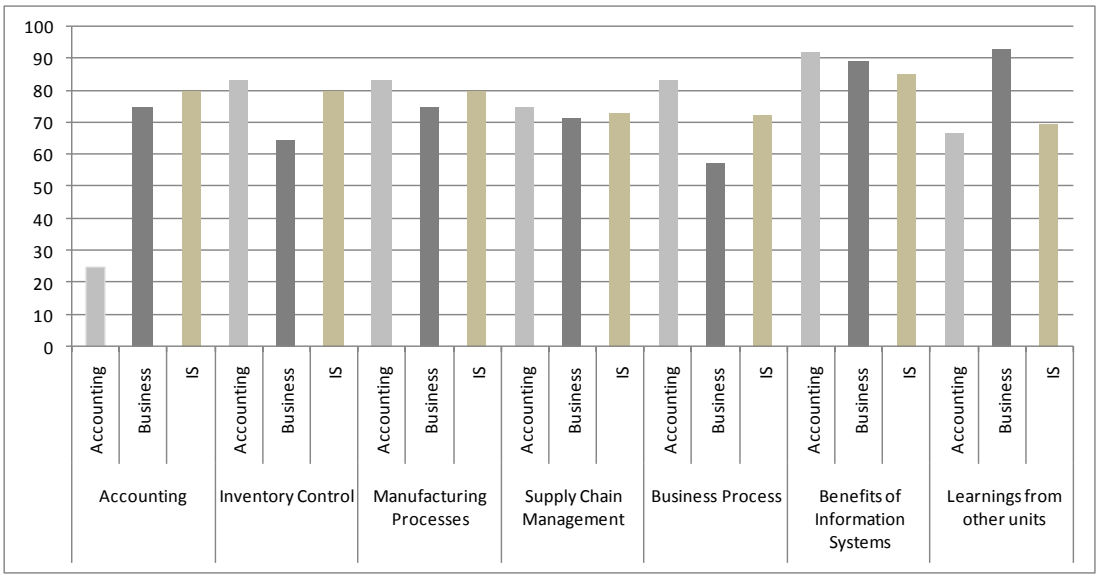
The survey instrument was designed to identify if students found the unit enjoyable and to understand how the unit, in the students' opinion, addressed the core knowledge domains. The following table shows the survey instrument.

Table 1: Student Survey Instrument

	Strongly Agree	***Agree***	***Neutral***	***Disagree***	***Strongly Disagree***
The unit was enjoyable					
The unit improved my knowledge of accounting					
The unit improved my knowledge of inventory control					
The unit improved my knowledge of manufacturing processes					
The unit improved my knowledge of supply chain management					
The unit improved my knowledge of organisation wide business process					
The unit improved my knowledge about the use of information systems					
The unit improved my knowledge about the implementation of information systems					
The unit improved my knowledge of the					
The unit helped me put in perspective leanings from other units					
The learnings are relevant to my course:					
My overall satisfaction with the unit is high					

The survey was completed anomalously and either left in the classroom or posted to Blackboard. A total of 74 students responded to the survey. All but one of the students strongly agreed that the unit was enjoyable (the single student being neutral).

The unit is included in a number of IS courses and may also be selected as an elective by accounting and business students. Only six accounting and 14 business students completed the survey. The survey results have been graded as strongly agree 100%, agree 50%, neutral 0, disagree -50% and strongly disagree -100%. The results by knowledge component across the three cohorts are shown in Graph 1 (results could range from -100% to 100%).



Graph 1: Survey agreement percentage by knowledge domain and student major

The data indicates that that the unit significantly improved students understanding of all of the surveyed types of business processes and functions. Not surprisingly accounting students learned less about accounting practices than other students. The course bias of prior knowledge is demonstrated in all categories. Nonetheless, one of the major findings was how the unit reaffirmed learnings from other units. Presumably this is because it helps students internalise the information using tasks situated in realistic contexts which, according to Reeves (1999), results in meaningful learnings. The overall satisfaction of the unit was 83%, with one student strongly disagreeing that they were satisfied! The student did not comment further.

The survey also allowed students to comment upon the elements they like the most, the elements they liked the least and add additional comments. However, there were disappointingly few comments. One student's comment was that they appreciated the "hands on approach and lots of tutorials", another that they enjoyed the "practical use of Dynamics", yet another that "I have got something new and different which will be very useful for my career" and "I like the assignment which provides practical knowledge". Pleasingly, one student commented that they "enjoyed the balance of theory and practice" another that "the small activities in the class, helped them understand business processes".

The negative comments included "confusion early on of which buttons to press and what's going on", one student did not like the separation between concept (lecture) and application (lab). Additional comments included "I always like to do practical units rather than theoretical ones. This unit is very helpful and enjoyable", and "show more short videos – powerful visual and interactive tool".

A group of students were asked why they found the unit reaffirmed other learnings. They explained that much of university education is concerned with macro business principles, such as strategy processes, and that it is often assumed that students understand more detailed business principles that are not actually fully understood.

CONCLUSION

The teaching of business process and implementation methods for ERP applications can be effectively provided by an authentic software learning environment. Students readily engage with the material and enjoy the sound educational outcomes. The unit reinforces Reeves (1999) assertion that " the real power of interactive learning to improve achievement and performance may only be realized when

people actively use computers as cognitive tools rather than simply interact with them as tutors or data repositories" (p. 17).

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Supporting Student Learning with Digital Audio: A Low-Tech Approach

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ABSTRACT

Advances in technology have made the use of digitized audio, often in the form of podcasts, more popular in recent years. The MP3 compression file format for such audio has become a defacto standard and the associated MP3 players are now ubiquitous. In the domain of eLearning, audio id perceived as a low-tech approach when compared with video technology. However such an approach can be useful as firstly, such audios can support mLearning as they can be listened to anywhere, and secondly, they are easy to produce for technology challenged instructors. This paper uses a teaching and learning framework as a basis for discussing how audio can support learning. It outlines some practical issues for instructors and students and provides suggestions for making the best use of audio. Some of the feedback obtained from online surveys that has been carried out with students at a university in Australia is utilised to support the discussion.

INTRODUCTION

The production of digital lectures by using audio or screencasting has been taking place for over a decade (e.g., Garner, 1997). A screencast is a video recording of the actions on a user's computer screen, typically with accompanying audio (Educause, 2006). Many universities are now taking advantage of the improvements in both hardware and software to encourage instructors to make greater use of digital lectures in the belief that this will help students in their learning. This paper discusses the student support provided by the simpler, low-tech option of just digitising the audio stream of a lecture. With reference to a framework of teaching and learning, the paper also indicates where audio can provide useful learning support beyond digital lectures. Additionally, feedback from an online survey that has been carried out with students at a university in Australia is used in the discussions together with practical suggestions for instructors.

ONLINE SURVEY

Fifty-three students who were undertaking an MBA unit in Information Technology at an Australian university were surveyed to determine their experiences using audio support in their learning. The survey instrument is shown in appendix A. The most useful feedback that was obtained from the survey came in the free text comments of questions eight and nine.

AUDIO PRODUCTION

The use of digitized audio streams and files has become popular because of the ability to compress audio into formats such as MP3. This has been driven in part by the music industry and, more recently, by the availability of audio podcasts and the associated subscription services via RSS (Really Simple Syndication). Students are therefore comfortable with MP3 files and such players have become ubiquitous, whether as a standalone device or as a feature within a mobile phone.

Low cost voice recorders are now available that allow voice recording directly to formats such as MP3 and hence this has become an easy way for instructors to produce audio for use by students (e.g. Olympus, 2008). The recorders can usually be directly connected to a computer's USB port in order to copy audio recordings to a computer's hard disc for subsequent uploading to the Web.

A TEACHING AND LEARNING DESIGN FRAMEWORK AND THE USE OF AUDIO

A generic teaching and learning framework has been proposed by Oliver & Herrington (2001) and this framework is heavily influenced by their belief that constructivism best describes how learning takes place. It comprises three critical elements, these being: learning resources (content); learning tasks; and learning supports as shown in figure 1.

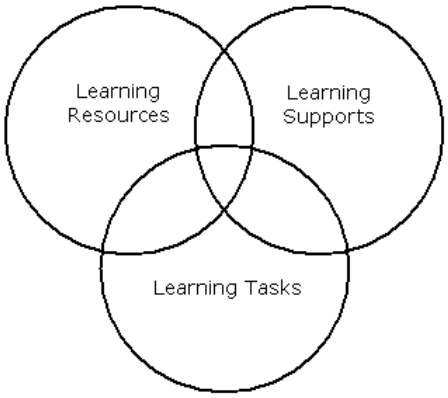

Figure 1: Generic Teaching and Learning Framework

Learning Resources

Learning resources provide the content for a course and can be thought of as the materials which are used to help students construct their knowledge and meaning with respect to a domain of knowledge. In most units of study, the major learning resources comprise a textbook and lectures, the latter usually having an associated set of digital slides most often in PowerPoint (Microsoft, 2008). It is in this area that the majority of screencasts have been produced with institutions providing infrastructure to support the production of such iLectures (e.g. Lectopia, 2008). Many studies show that students believe that such iLectures improve their learning experience and provide greater flexibility with the capability to study anytime and anywhere (e.g., Phillips et al, 2007; Boffey et al, 2006)).

Using such specialised infrastructure to produce digital lectures means, that without access to such teaching rooms, many lectures cannot be digitised. However a cost effective options is to produce digitized audio streams of lectures. The author has produced such digitized audio for all lectures in an MBA unit at an Australian university and posted them to the university's content management system. A high end portable voice recorder was used which enabled the capture of audio directly to MP3 format. The advantages of recording lectures in this way include: reduced file size; the ability to play the audio on a portable player; the instructor being able to move freely around a lecture theatre; a low-cost solution; and it is easy to capture student questions. The disadvantages include: the instructor needs to remember to always indicate verbally which slide is being discussed; and visual aspects such as the instructor pointing at certain sections of a slide are lost.

In the survey of 53 students, 39% indicated that the recordings were very helpful, and 45% indicated that they were quite helpful. Some lecturers have concerns that student attendance might be reduced because of such supports, and 3% of students indicated that they very often missed lectures because of the availability of recordings, and 52% indicated that they sometimes missed lectures. These results might suggest that in order to "encourage" attendance, such recordings should not be utilised. In discussions with students on this matter, students who regularly attended made the very valid point

that they should not be penalised by the withholding of a valuable learning resource because other students chose not to attend. This is an interesting area for debate.

Other student feedback from the survey indicated that they preferred the audio format to screencasts for a lecture that just utilised PowerPoint slides. This was found to be somewhat surprising, however one of the reasons given by students was that it enabled greater flexibility. For example, some students would print out the PowerPoint slides and load the audio to their portable music players. They could then review a lecture on a bus or train on their journey to or from the university. A selection of comments from students concerning audio lecture recordings included:

- I can study anywhere, anytime by listening to an audio recording via my mp3 player;
- I missed a few lectures (not BECAUSE they were recorded) and this was an ideal way to still get all the information;
- Sometimes I cannot understand clearly because of language. So the audio recordings are very useful for me to review the lecture;
- If I didn't understand something during the lecture or I was temporarily day dreaming when the lecturer said something important, then I can refer to the audio;
- It helped me concentrate more on the important notes or comments given by the lecturer and helped my understanding the case studies;
- English is not my first language so recording is very useful for me;
- Even if I missed a lecture, I would probably read a textbook rather than listen to a recording because listening to audio can be very time consuming; and
- Can be improved by always indicating the slide number while recording (if possible).

Students also indicated that they would become frustrated if there were long pauses in lectures (i.e. the lecturer pausing). One good side effect of using a digital voice recorder is that the majority of recorders can be set to "voice activation" resulting in the elimination of such pauses.

In conclusion the audio lectures were clearly popular with international students where English was not their first language. Also students found them helpful in clarifications of more difficult concepts. However there was an indication that it was time consuming to listen to a lecture again and that the instructor should help in slide navigation by clearly stating the slide that they are "talking to".

Learning Tasks

Learning tasks comprise the second element of the design framework and play a fundamental role in determining learning outcomes (Wild & Quinn, 1997). The tasks determine how learners engage with the resource materials and well designed activities should be active and engaging.

The tasks form the main basis of most units of study and they ensure that students actively engage with the learning resources in order to complete the tasks. Tasks are usually set by instructors in text format and, dependent upon the clarity of the textual description, will elicit queries from students as to what is actually required by the instructor. The author has found that the production of a short audio of a verbal description of the task helps reduce student queries, and often fears as to the task requirements. Such audios enable an instructor to easily embellish the textual description, are easy to produce, and can quickly be added to a content management system such as Blackboard (Blackboard, 2008). A comment from a student concerning such audios was:

- I liked to listen to you tell me what the I must do when you explained the unit plan;
- As an external student I found the explanations by the lecturer of what was wanted in the second assignment really helpful.

Students can also be required to "talk through" their solutions to tasks thereby having to consciously think about why they solved problems in particular ways; or to discuss case study analyses. This ensures that students have had to go through a process of reflection and instructors gain value from such student audios as they are able to determine what students have learnt and gain insight into the mental models of the students. There are many freeware tools that allow students to make such recordings on their computers, a popular one being Audacity (Audacity, 2008)

Learning Supports

Learning supports are the third element of the instructional design framework and can be thought of as the supports required to help guide and provide feedback to learners in a way that is responsive and sensitive to learner individual needs (McLoughlin & Oliver, 1998). In "traditional" settings such supports have been provided by actively involved teachers (Laurillard, 1993) whereas in technology based learning environments, such supports are often known as 'scaffolds' to help learners during their knowledge construction process (Roehler & Cantlon, 1996).

In order to succeed with the assigned learning tasks, students need to engage with learning resources. However, as in all learning, there are times when students need help or advice and this is where the third part of the framework, learning supports, is utilised.

In face to face lectures and tutorials, a student might gain learning support by listening to the answer to a question that they ask their instructor. A useful side effect of the instructor's response is that other students in the group who did not ask the question, also gain support vicariously. Such vicarious support can also be gained using audio (e.g., Cox et al, 1999). The first example is in the audio recording of a lecture or seminar in which a student asks a question. The response to that question can be recorded thereby providing vicarious support. A second example is the use of frequently asked questions (FAQs). Students can normally learn vicariously by "looking" at answers that have been provided to previous student questions, however it is easier in many cases for an instructor to record short audio answers.

Comments from students concerning the use of audio as a learner support included:

- I liked to listen to your replies to questions I was afraid to ask; and
- In some of the audios it would be helpful if you could repeat the questions from the students before replying as it was hard to pickup from the audio.

The first comment demonstrates that vicarious learning can take place for students who are too shy to ask questions during lectures and seminars. And the second comment suggests that the author's audio recording technique probably needs improving. The author has a small microphone that he attaches to his shirt and is able to move around a lecture or seminar room. However capturing student questions has clearly not always been done well.

OTHER STUDENT FEEDBACK CONCERNING THE AUDIO RECORDINGS

Other feedback from students concerning the use of audio was as follows. Firstly 86% of students indicated that they had listened to the audio on their MP3 players. Of those, 21% stated that they did this "very often" whereas 65% stated that they did this "once or twice". Student comments included:

Student Comment	Discussion
I often use it on the way of university. It is very helpful for me on and hope to others also. There should be audio for all lectures.	This demonstrates the usefulness of the portability of MP3 audio as the student would listen to recordings when commuting to university. And of course, having appreciated the usefulness of a resource, the same

	student makes the suggestion that all units of study should use audio.
I can do several things while I listen to the audio.	This reflects the multitasking abilities of generation X and Y students!
I attended every class so I didn't really make use of the audio however I feel comforted by the fact that if I did need to listen to the class it is available. For the small amount of resourcing it requires I think it is a valuable tool	This indicates that students like the comfort that their studies will not be adversely affected should they have to miss a lecture. And as pointed out, the recoding of audio requires a low-level of resourcing on the part of the instructor.
I never used the audio, because I never missed the class, but I think when I am preparing from exam it will be helpful	This shows that the recordings might be used as a resource to help revise materials before examinations.

SUGGESTED GUIDELINES FOR PRODUCING LEARNING RESOURCES

From the instructor's experience in preparing and utilising audio recordings together with the student feedback, a set of guidelines has been produced. These are as follows:

- Repeat student questions as they might not have been clearly recorded.
- When "talking to" a PowerPoint slide, state the slide number to give audio navigational cues for students.
- Ensure that such a voice recorder can produce audio in MP3 format and can directly upload to a computer via the USB port. This will reduce instructor time.
- Produce short audio recordings to clarify the details of student tasks.
- Where possible, include a requirement in a task for students to create an audio so that they can exercise reflection and higher order thinking. Students can utilise available freeware for this purpose.
- Consider using screencasts and audio for feedback to student assignments.
- Make use of such feedback as a learning resource / support in subsequent semesters for other student cohorts. For example, an instructor can talk through a student essay or report and post this to the Web.
- Create short audios as answers to certain student questions in areas of conceptual difficulty. Some might be able to be used as answers in a "frequently asked question" list.
- A podcast can be used in a task requiring students to listen and answer questions. There are now many excellent commercial podcasts available.

CONCLUSIONS

Improvements in technology have enabled instructors to quickly and easily produce digitized audios and podcasts. This paper has attempted to demonstrate how the technology can be used to produce not only learning resources, but to also help in the areas of learner tasks and learner supports. The author advocates the use of "low-tech" solutions as, although many universities are equipping certain rooms with specialist video recording equipment, not all instructors have access to and can therefore make use of such rooms. The production of technology supported resources, tasks, and supports is more likely to become pervasive with "low-tech" solutions. The author has given several workshops to fellow lecturers on the use of audio recordings to support learning. Feedback has been very positive as many lecturers are clearly interested in a simple low-tech system that they can take anywhere and that would not become a burden to them and not increase their workloads.

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Appendix A
Survey: Audio Recording of lectures

The lectures have been recorded this semester. Please answer the following:

1. What is your gender? **Response Required**

- ○ Female
- ○ Male
- ◉ No Response

2. What is your age? **Response Required**

- ○ 18 - 25
- ○ 26-35
- ○ Over 35
- ◉ No Response

3. What Internet access do you have at home? **Response Required**

- ○ Broadband
- ○ Dial-up Modem
- ○ None
- ◉ No Response

4. How helpful to your learning were the audio recordings (mp3 files) of lectures? **Response Required**

- ○ Very helpful
- ○ Quite helpful
- ○ Little help
- ○ None
- ◉ No Response

5. How often did you use the audio files on an mp3 player? **Response Required**

Very often
Once or Twice
Never
Not applicable as I do not have an MP3 Player
No Response

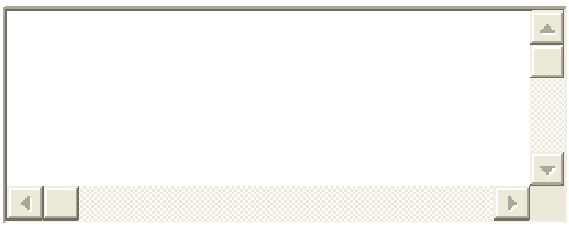
6. Where did you mainly use the audio files? **Response Required**

At home
At university
On the way to or from university
Other
Not applicable as I never used the audio files
No Response

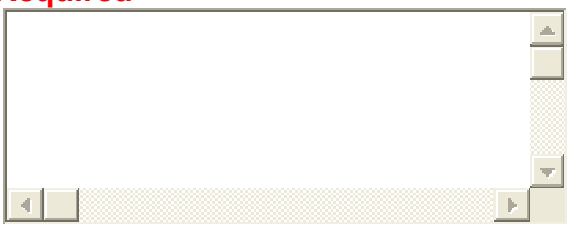
7. How often did you miss lectures because I recorded them (do not worry - you will not get into trouble!)? **Response Required**

Very often
Sometimes
Never
No Response

8. Please write a comment about why you found the audio recordings useful (assuming that you did!) **Response Required**



9. Please suggest how the audio recordings could be improved. **Response Required**



Click here to submit survey | Click here to reset responses

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A Strategic Planning of Thailand Vocational Education Management

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ABSTRACT

Purpose – To identify the relevant factors that have significant influences on the vocational education system of Thailand and to propose an approach for future development and/or improvement of the system's strategic plan.

Design/methodology/approach – To identify and study the major factors that have significant influences on the development of strategic plan, three rounds of surveys using Delphi Technique on **17** individuals comprising students, teachers, administrators, and professionals and 9 well-known experts in the field of vocational education of Thailand were conducted. The approach for strategic plan development was obtained by conducting a group discussion for the 9 experts using Focus Group Technique. The experts then contributed their ideas, which finally led to the approach for the strategic plan development.

Findings – Seven major factors to be considered in development of the strategic plan for vocational education of Thailand are politics, economy, society, culture, environment, technology and management and administration. The experts contributed their opinions on how these factors should be directed so that their positive influences on the education system can be guaranteed.

Practical implications – The finding of this research provides guideline for educational administrators and policy makers on how the future vocational education of Thailand can be improved. The methodology can also be applied to future researches with minimal modification.

Originality/value – The research is recognized as a rigorous effort to reveal and emphasize the problems in Thailand's vocational education and also to provide recommendations for their remedial approaches. It demonstrates how two different survey techniques can be mutually applied.

INTRODUCTION

While moving along with rapid development of the world, Thailand society has gradually shifted from agriculture-based to industry-based in the past half decade and is now entering information technology era. Since the changes have been taking place in relatively fast pace compared to the nature and characteristics of Thai people, there have been concerns that the change may bring along some adverse effects which will harm the society in the long run due to lack of experiences and readiness of the society. To ensure the nation is capable of coping with vigorous changes in its society, the National Economic and Social Development Plan No.10 (2007-2011) by **Office of the National Economic and Social Development Board (NESDB)** was aimed to develop and/or strengthen social and economic capitals, natural resources and most importantly human resources. The goals were to improve living standards of the people by eradicating poverty and to make Thailand a knowledge-based and intellectual society. In order to achieve these ambitious goals, however, education of the country, in terms of quality, quantity and management system, needs to be sufficiently provided.

As one of the major education systems of Thailand, vocational education established its importance by preparing skilled workforces for the industrial sectors for years; unfortunately, it's rather significant

role has not been greatly appreciated and often overlooked by Thai society. In fact, the vocational education system of Thailand has been plagued with a number of problems, both quantitatively and qualitatively, as presented in the study of Soranin, B. and Others **(2005)** pointed out that there has not been any clear directions in vocational education while its system keeps expanding without adequate resources and supports provided for the schools; the teaching personnel are heavily overloaded as they are short in number compared to the students; the students do not have sufficient basic knowledge due to their weak academic background. Moreover, cooperative activities between the institutions and the industrial sector are very minimal, while standards for several professions have not been established. According to a study by **NESDB** in 2005, the workforces produced in Thailand vocational education system could not match the demand of the country, as many students decided to move on to study in higher education level. This is because remunerations are rather small and hence unsatisfactory for vocational college graduates due to the fact that their quality does not meet the requirements of the employers. With regard to curriculum and management system, it was found that the present curriculum seems to be lacking balance between theory and practice. This is certainly one of the factors undermining the quality of vocational college graduates.

From the management and education points of view, it is obvious that the entire system of Thailand's vocational education has been very problematic and urgently needs serious attention of the society and the government. Considering the nature and scale of the problems, it is necessary that whole picture of the system needs to be investigated and an integrated remedial measure must be implemented. As an educationist who has been involved in Thailand's vocational education for years, the author was very keen to take part in tackling this challenging problem in the field of education. Thus, in this research study the author has conducted a study using direct interview, Delphi and Focus Group techniques on three different populations. The main objectives of this research are to identify the factors that have significant influences on the management of vocational education of Thailand and to develop a strategy for the future planning of this vital part of Thailand's education system. Since this study procedurally comprises 3 distinctive stages, it will be presented in 3 sequential phases. The methods and results of each phase will be presented sequentially as well.

IDENTIFICATION OF INFLUENTIAL FACTORS

The initial phase of this research study was to identify the factors having significant influences on the vocational education of Thailand.

Methods

Fifteen voluntary individuals comprising 12 students randomly sampled from different vocational colleges, an instructor from public vocational college, an instructor from private vocational college and an academic from Office of Vocational Education Commission, Ministry of Education, were invited to participate in open-question interviews. In the interviews, all participants answered the questions and expressed their view on Thailand's vocational education. The interviews were audio-taped and subsequently synthesized and analysed together with supporting data from relevant research studies. After about one month of extensive works, qualitative data for major influential factors in vocational education of Thailand were obtained.

Results

Following the data syntheses and analyses conducted by the author, six factors were identified as they were believed to have strong influences in today's vocational education. Therefore, they were selected for the major influential factors to be studied in development of the strategic plan for vocational education of Thailand. These six factors are politics, economy, society, culture, technology and management, and administration. This conclusive result was then utilized as the guideline for developing the questionnaires for the preceding phase of analysis.

DELPHI ANALYSIS OF INFLUENTIAL FACTORS

In the second phase, a combined qualitative and quantitative analysis of the six influential factors identified from the study in Phase 1 was performed using Delphi Technique. The objective of this phase of the study is to gather the views and opinions of professionals in the field of vocational education on the influential factors identified in the previous phase of study. Each influential factor was examined in detail and the results were carried over to the following preceding phase of study and used as the foundation for development of the strategic plan. 17 of 35 initially selected participants, who are professionals from different vocational institutions and industrial sector and experts from the Ministry of Education, have thoroughly participated in this 3-month survey.

Methods

Step 1: The participants were requested to fill in a questionnaire with questions for open-end response, which was developed based on findings from interviewing the participants in Phase 1. Five weeks had been spent in distributing and collecting the questionnaire forms.

Step 2: After studying the answers of the participants obtained from Step 1, the author constructed another questionnaire comprising 45 questions of 6-rating-scale type for the participants to fill in. The quantitative results of these second-round answers were statistically analysed and the values of mode, median and interquartile range were obtained. This step also took about five weeks to complete.

Step 3: With the statistical data from Step 2 results showing the median and inter quartile range for each question and the ranks of their answers given to them in advance, the participants were asked to review their previous answers. In case their answers were not within the inter quartile range, the participants needed to provide the reasons why they selected such answers. Finally the participants were requested to fill in again the same questionnaire they had answered in Step 2 in order to confirm or to change their opinions. A statistical analysis was again performed on the results obtained from this step and the values of mode, median and inter quartile range were calculated.

Results

In summary, the participants agreed that the six factors identified from the beginning phase are the factors that have significant impacts on Thailand's vocational education. Their further opinions about these factors contributed to this phase of study. Their suggestions are as follows:

From the political point of view, Thailand needs to decentralize the power and authority in management of its vocational education system so that the local authorities can be more involved in decision makings. Political stability of the country is essential as it will ensure a clearer direction, hence more effectiveness and continuity for execution of the government's policy on vocational education. Moreover, policy and law makers should be aware of vocational education's important role in development of the nation and should therefore consider providing it a long-term and sustainable development plan.

Considering the critical role of vocational education in generating work forces to fulfil the industrial sector's demand, which has been increasing considerably following rapid growth of the country's economy, a high increase in demand for personnel in vocational education, especially those with managerial expertise in vocational education system, can be anticipated. It was suggested that a network system for vocational education management be created among the parties involved so that the future demand in workforces can be accurately forecasted. In addition, more efficient quality-control measures for vocational education system need to be established in order to ensure that the graduates meet the employers' requirements.

As an agriculture-based society, it was suggested that Thailand's future system for vocational education be emphasized on supporting local agriculture-based industries as much as possible, in order to create jobs for the local people and hence keeping them happy in their hometown. This will give major relief to the Thai society that has been plagued by social problems caused by increasing population in the major cities. Another major problem that needs to be resolved urgently is long-time negative social impression on vocational students and institutions as violent incidents due to conflicts between students from different vocational colleges have taken place for a few decades. To resolve this sensitive issue, strong supports from the whole society are necessary; nevertheless, willingness of students, and school staff to change their image needs to come forward.

Ethics, morality and social values in Thai society were found to be declining rapidly in the past few decades due to adoption of capitalism and overwhelming invasion of some inappropriate foreign tradition and/or cultures. As a result, the society is vulnerable to losing its entity and values. It was recommended that sustainable development of local intelligence and culture need to be promoted and introduced into vocational education curriculum, as this will be part of the foundation for building up individuals with high morality and strong value in the future.

To ensure that the graduates can keep up with rapid development in the world's advanced technologies, more science-related subjects should be included in the curriculum. In addition, ability to apply knowledge can be developed by allowing the students to experience modern equipment in practicing courses and workshops as much as possible. Hopefully this can help create or strengthen the habit of continual self-development for the students after their graduations.

From the management and administration points of view, it was recommended that the vocational curriculum should be developed based on the industrial-sector needs. The personnel in vocational education system, particularly teachers and administrators, must be qualified and experienced professionals who are willing to take part in developing high-quality graduates that meet requirements of the industrial sector.

Following the findings presented above, the author created a draft strategic plan for vocational education management of Thailand, which would then be revised and/or refined in the following phases of study before being finalized as the strategic plan.

FOCUS GROUP ANALYSIS

The third phase of this research study was to have the draft strategic plan created at the end of the previous phase reviewed by senior experts, who are very well-known in Thailand's vocational education. Nine well-known experts in the field of vocational education comprising Deputy Secretary General for Office of Vocational Education Commission, Ministry of Education, Chairman Industry Council, 5 high-level administrators and academics from vocational institutions, and 2 academics from **NESBD** were invited to participate in this survey, for which Focus Group Technique was employed. The objective of this phase of study was to acquire the experts' views, through their comments and recommendations, on the draft strategic plan previously developed.

Methods

The following three steps took place in this 3-hour discussion using the Focus Group Technique:

- The draft strategic plan and the analytical data obtained from Delphi Analysis were first presented to the experts by the author for their review, comments and recommendations.
- The experts were then given 10 minutes each to present their comments on the draft strategic plan.

- After presenting his comments and viewing comments of the other participants, each expert was given 5 minutes to add his recommendations to the draft strategic plan.

In addition to contributing their comments and recommendations, some of the experts went on to assist the author in concluding the results of this Focus Group meeting.

Results

With regard to the political factor, it was agreed that there is a need for a clear and convincing plan for development of the nation's human resources, which should include the strategic plan for vocational education management. On the other end, the students and vocational institutions need to respond by providing information regarding their needs for the local authorities and politicians.

Economically, more efficient quality-control measures for vocational education systems need to be established. The government should also consider increasing the per-head subsidizing budget to suit the actual cost of vocational college study. The country's economy development plan should take into consideration the strategic plan for vocational education management.

The vocational institutes need to strengthen coordination and cooperation with the industrial sector, especially in the local society, so that the workforce demand can be better estimated. This can prevent problems of oversupply or undersupply in the workforces produced by the vocational institutes. In addition, strong public relations will help create awareness of true image and values of vocational education for the society so that better social support to the students and the institutions can be the result.

The experts agreed that morality and ethics should be increasingly inculcated into vocational students. Besides, the vocational education management should pay particular attention to the cultures that are fundamentals of life.

The experts' opinion regarding the technology factor was that a technology-integrated teaching system should be implemented in vocational education, as it may enable the students to develop technology for themselves in the future. Moreover, the national policy should be strongly emphasized on sustainable development of science and technology.

Similar to the finding from Delphi Analysis, the experts stressed that the vocational curriculum should be developed based on the needs of industrial sector. Short courses and trainings should be available for present workforces to ensure their self-development. Group study could also be a good alternative, as internal relations within the group and inter-relations between different groups will enhance exchange in knowledge and experiences between the learners and instructors. The managers and administrators should be knowledgeable and up-to-date in modern technology so that the management and operation systems can be most cost-effective.

DEVELOPMENT OF STRATEGIC PLAN

By incorporating the expert's comments and recommendations obtained from the phases of Focus Group Analyses and some supporting data from the Strategic Plan for Human Resources Development prepared by **NESDB** (2005), the author subsequently revised the draft plan created at the completion of Delphi Analysis and the final results were proposed as the strategic plan for management of Thailand's vocational education, which is summarized as follows:

Sub-strategy 1

Create public awareness of how important vocational education system is for the development of the nation among all parties involved in vocational education management. Decentralize the power in

vocational education management based on Five-Main-Tasks Scheme proposed by **Office of Vocational Education Commission (Siripan Choomnoom, 2008)** in order to promote more involvement of the local authorities. In the school level, decentralization can be achieved by school-based management in academic, personnel, budget and management. The political sector must assure that the needs of the educational sector, industrial sector and the local society are fulfilled. This certainly requires good cooperative efforts from the top-level management to the operation level. In addition, it is necessary that the politicians with good knowledge and understanding in vocational education be assigned the tasks in developing education policies.

Sub-strategy 2

Take in consideration the nation's economic and social development plan in vocational education planning and management in order to ensure that quantity and quality of the workforces suit the country's demand. Provide adequate the per-head subsidy budget so the parents and students do not have to shoulder excessively high education cost; this may be in the form of government education loans. Utilize Integrating Model – Learning Package composed of knowledge, skill, good attitude and teamwork **(Siripan Choomnoom, 2008)**

Sub-strategy 3

Develop a vocational education network between the government sector and the private sector in producing the workforces, especially in the occupations which are highly demanded. Strengthen the industrial sector by creating a cooperative network among the industries that are similar in nature.

Sub-strategy 4

Develop and/or upgrade technological skills and teamwork attitude of the present workforces in the industries by providing short courses and on-job training programs and promoting self-study through long-distance education.

Sub-strategy 5

Develop the curriculum for vocational education following the direction given by the nation's economic and social development plan, so that the production capacity of the workforces can be optimized. Implement co-operative education, which is more emphasized on on-job training.

Sub-strategy 6

Improve the social image and value of vocational education by enhancing public relation. To improve the skill and overall quality of the new graduates, the private sector needs to be involved in providing more supports to vocational students, especially in practical training, while the government sector can help motivate the private sector by implementing measures like tax exemption. Furthermore, reasonable salary structures and career advancement need to be provided for the vocational graduates who have been proved to be qualified for their jobs.

DISCUSSION

As it is necessary that influential factors be identified by those who are closest to the problems and most directly affected by its management system, the vast majority of population for this phase of study are vocational college students, with two instructors and one academic included. To ensure that variety of the population covered Thailand's diverse society, the students were selected from different programs of vocational colleges located in different parts of the country. Therefore, the results should be reliable to a certain degree. This has been well supported in the following phase of study (Delphi

Analysis) as all participants, who are professionals of various work experiences in the field of vocational education, generally agreed with the proposed six influential factors.

In the phase of Delphi Analysis, the participants spent about 3 months of their time during the three rounds of surveys; therefore, the results are very informative and considered sufficiently satisfactory by the author. By being allowed to review their answers and the statistical data after the second round survey, the participants developed broader understanding and became more confident in giving their final answers. It was unfortunate that 18 participants were unable to continue going through the entire process; otherwise, more comprehensive results could probably be obtained. Nevertheless, with sufficient amount of time given, Delphi Technique was proved to be a suitable tool for this phase of study.

As time available was limited due to the busy schedules of the experts participating in the Focus Group discussion, the comments and recommendations contributed were not very extensive; however, these comments and recommendations were considered valuable for the development of strategic plan, as they were given from different point of view from the ones from which the strategic plan was drafted. For future studies, different survey technique may be considered in the situations when time restraint is anticipated.

In conclusion, the proposed strategic plan developed in this research study should provide some fundamental ideas of how the future vocational education of Thailand may be planned and structured. Implementing the proposed strategic plan means changing the entire system, which probably needs a major reform and is definitely time-consuming. However, such major reforms may be inevitable if vocational education is to continue its significant role in Thailand's education, as **Siripan Choomnoom (2008)** forecasts that future trends of Thailand's vocational education training are competency-based learning, open entry/open exit, flexibility, partnership-dual program, validation of experiences, accumulative credit bank system, self-learning/e-learning, IT application, and sufficient economy and sustainable development. Nevertheless, the author hopes that part of the finding of this study be applicable as remedial measures to some problems in vocational education of Thailand at the present time. Finally, it is suggested that further study should take into consideration other influential factors that have not been covered in this study.

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Higher Education and the Challenge of Growth and Sustainability

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ABSTRACT

The first part of this paper explains the linkage among higher education, internationalization, development and social justice. The paper argues that universities are institutions that, in all societies, have performed basic functions which result from the particular, combination of cultural and ideological, social and economic, educational and scientific roles that have been assigned to them. They are multi-purpose or multi-product institutions, which contribute to the generation and transmission of ideology, the selection and formation of elites, the social development and educational upgrading of societies, the production and application of knowledge and the training of the highly skilled labour force. This range of functions and duties shapes the main tasks of higher education systems, albeit with different emphases depending on the national context, the historical period, the specific sector and indeed the institution concerned. What is clear is that nowadays, universities are highly involved in literally every kind of social and economic activity in our increasingly dynamic societies.

The second part of this paper discuss another closely related and important issue of concern in the development of education in the last quarter century, this refers to private higher education. Private education is not a new phenomenon in many countries, though modern private education is of recent origins. The paper argues different aspects in private higher education and discusses myth and realities about privatization of higher education. This paper suggests that initial government investment on a large scale is important in higher education; but only after some time, and certain level of educational and economic development is achieved. Private sector can or may complement the state effort in higher education.

INTRODUCTION

A review of the complex and dynamic processes of internationalization at different levels in higher education reveals that these processes are prompting increasingly rapid change in two rather different aspects (Teichler, 99). First, there is now a wide range of border crossing activities, many of them resulting from institutional rather than governmental initiatives, and these are certainly still on the rise. But we can also see more substantial changes towards systematic national or supra- national policies, combined with a growing awareness of issues of international cooperation and competition in a globalizing higher education market. Under the first heading there is a growth of specific, clearly visible international co-operation, including activities such as student and staff mobility schemes, co-operative research activities and foreign language teaching to support them; under the second, we can see trends towards internationalization, regionalization of the actual substance and structure of higher education, such as, proposals for convergence in institutional patterns, study programs or curricula.

The contemporary university was born of the nation- state, and it was only in the nineteenth and twentieth centuries, following the establishment of clear national economic interests, that universities acquired their identification with science and technology. Their regulatory and funding context was, and still is, national; their contribution to national cultures was and still

is, significant; students tended to be, and still are, trained to become national functionaries; and universities played, and still play, a considerable role in what some have called the military industrial complex of nation- states. In this perspective, they are very much national institutions. It is appropriate, therefore, to see current trends as part of a process by which national systems of higher education are being challenged by new forces of internationalization. Universities are thus object as well as subject of "internationalization" or "globalization". They are affected by and at the same time influence these processes.

One of the key features of globalization is increased competition. Competition has become a driving force for innovation and entrepreneurship. Competition in higher education has increased and has become unfair. Countries of the North with their competitive advantage compete with countries from the South, for best students, faculties, administrators, and researchers. As a result the intellectuals resources from the South are been drained in the process. It is estimated that Africa has lost 100,00 people with specific skill to the West (Bollag, 2001). The loss is estimated at about 23,000 qualified academic professionals each year for Africa. The countries reported to lose the most academics are Egypt, Ghana, Kenya, Nigeria, and South Africa, Russia reports a loss of 30,000 researchers (The Chronicle, September 8,200). Brain drain is reported to be the greatest obstacles to development.

Countries from the South are at risk of being further marginalized if their higher education institutions fail to participate in the knowledge production networks and activities that would make them relevant and more responsive to needs of a new economy. A concern has been raised by academics from the South about lack of collegiality and concern amongst academics from the South and those from the North within a competitive environment. Competition has resulted in student losses to private for profit higher education, loss of jobs, and in some cases the threat of closure of institutions. Competition in academia has continued to perpetuate the negative effect of globalization such as increasing inequality both between academics within institutions and between academic in different institutions and countries (Moja and Cloete 2001).

HIGHER EDUCATION AND INTERNATIONAL ARENA

There is need to raise the issue of the role of higher education in development in the context of regions such as Africa where nearly half of Sub-Saharan Africa's 600 million people live on less than $1.00 a day, more than a third of children are malnourished, people are dying of AIDS with minimal improvements in education and health. In the globalizing economy higher education has featured on the WTO agenda not for its contribution to development but more as a service to trade in or a commodity for boosting income for countries that have the ability to trade in this area and export their higher education programs. Higher education has become a multi-billion dollar market as the quantity of education is increasing rapidly and it is reported to double every five years. It is reported that the export of higher education service has contributed significantly to the economy of the US. In 1999 it is estimated that the US, being the largest provider of education services, earned $8.5 billion of the $30 billion market, from this trade alone (Heyward,2002).

There is need to rethink the role of higher education in national development as national economies are slowly been replaced by a global economy and national higher education is being slowly replaced by global systems of higher education. Higher education role has shifted more to supporting an economy that is knowledge intensive at a global level. The relevance of higher education systems at local levels needs to be rethought in the framework of their relevance in the global context, hence the question as to whether they are still relevant to development at a local level. Changes taking place have put a lot of emphasis on the need for accountability to society beyond financial accountability, demand for intellectual leadership, and partnership that could contribute to development.

Misperceptions about higher education's role in truly sustainable development have persisted for too long. No modern country has become prosperous without a strong higher education system. Yet this has not persuaded some from wondering whether poorer countries can afford to invest in higher education. But it is lack of investment in higher education-within a comprehensive approach to sound education at all levels-that continues to hamper out efforts to eliminate poverty, we should be clear and unequivocal in the reasons why poverty cannot be overcome without the benefits of higher education while we get on with the work of building stable, high quality higher education systems in all countries.

This paper discuses on higher education's value added to development with respect to capacity enhancement at the individual, institutional and social levels; science and technology, for the knowledge needed to tackle problem of health, food security, sustainable use of the environment, among others; The knowledge economy-to integrate knowledge production, application, and dissemination; productivity-and its links to prosperity.

Lessons over the last decades of development assistance point to the critical role of capacity enhancement in promoting sustainable development. At the heart of capacity enhancement is the importance of intellectual capacity in analyzing national development challenges; formulating policy options to patient record management specialists, etc. All acquired their particular skills through some type of education.

We know also that flexibility and adaptability are needed in both the labour force and in social institutions. Higher education develops the cognitive abilities that allow individuals to adapt to a greater range of complex social situations. The resulting differentiation is the basis of a number of key institutions and practices that allow countries to maintain a high level of wealth.

- Had higher levels of earnings than both the population in general and their parents.
- Were employed in jobs that required multiple skills, especially computer skills,
- Had better overall health, with lower levels of cigarette smoking, obesity, less depression and a greater overall sense of well-being.
- Held beliefs and attitudes more conductive to social cohesion and civic harmony, including a greater belief in racial equality.
- Less unquestioning acceptance of authority, higher voting rates, more community volunteerism, and-among those with children-greater involvement in parent teacher associations;(Revisiting the Benefits of Higher Education; Report by the Bedford Group for life course and statistical studies, Institute of Education, April, 2003).

PRIVATE HIGHER EDUCATION

Another closely related and important issue of concern in the development of education in the last quarter century refers to private higher education. Many of the private institutions are privately managed, but are funded by the State to a substantial extent. 'Complete' or 'pure' private institutions may now be very few in number; but they are rapidly increasing in number.

Private higher education institutions in education have been growing rapidly in all countries. The private sector meets a large part of the demand for higher education 70 per cent in Japan, Korea, and Taiwan. As high as 73 per cent of all universities, 84 per cent of all junior colleges in Japan are private, enrolling more than 70 per cent of total students in these institutions in 1992. Korea provides yet another example of extensive higher education operated by the private sector: 84 per cent of higher education institutions and nearly 80 per cent of higher education enrolment were in the private sector in 1993. Private higher education institutions in Taiwan outnumber public institutions 2 to 1, capturing 70 per cent of the enrolment. The share of private enrolment in higher education in Japan, Korea, and Taiwan are among the higher in the world; and no country except

the United States has enrolment in private institutions adding up to more than 10 per cent of the total enrolment in higher education, and even there the figure is only 10 per cent. In a sense, the Korean and Japanese experience combined seems to be in sharp contrast to the traditional welfare-state approach -- not to mention the traditionally important role of the state in the provision of education that dominates the pattern of educational development in European economies such as the United Kingdom, Sweden, Switzerland and Italy, and in the United States and Canada as well. Many other economies in East Asia – Singapore, Taiwan, Hong Kong, and China -- do not rely on private financing to the extent that Korea and Japan do.

Private education has grown, essentially to meet excess demand and differentiated demand for higher education. First, the social demand for higher education exceeds the public supply, and the private market seeks to meet the unsatisfied demand. Secondly, demand for different quality (presumably high quality) and content in education (such as, for example, religious education) also contributes to the growth of privatization. On the supply side, private entrepreneurs are ready to provide higher education either for philanthropic or other altruistic motives, or for profit. The dividends could be quick economic profits, besides social and political gains.

The case for privatization of higher education exists mostly on the basis of financial considerations. Public budgets for higher education are at best stagnant, and are indeed declining in real terms, more particularly in relation to other sectors of the economy. Privatization is also favoured on the grounds that it would provide enhanced levels of internal and external efficiency of higher education, and higher quality of education; and as the private sector would have to compete with the public sector, the competition would result in improvement in quality and efficiency not only of private education but also even public higher education. In the long run, due to economies of scale, private institutions provide better quality education at lower cost than public institutions, as in Japan.

On the other hand, privatization is opposed on at least three sets of reasons. The existing market system does not ensure optimum social investment in higher education, as externalities exist in the case of higher education, which is a ‘ quasi-public good’. The market system also fails to keep consumers well informed of the costs and benefits of higher education. It is likely that the costs of private education are much higher than public education as in the United States and the Republic of Korea. Finally, a private system of higher education is also insensitive to distributional considerations, and in fact contributes to socio-economic inequalities. Accordingly, public education is not only superior to private education, but private institutions cannot even survive without state support.

One of the most common myths is that there is huge demand for private higher education, as private education is qualitatively superior to public education. But the available evidence shows that the higher quality of private education compared with public higher education is exaggerated. Even the availability of space per student and other facilities are reasonably higher in public universities than in private universities in many countries. For example in Japan private universities spend less than half of what public universities spend per student . It is only in the United States that the difference is in favour of private universities. All this should indicate that quality differences are indeed more favourable to public than to private universities. Yet private universities may sometimes show better results in final examinations, as essentially they admit only the best prepared students with better socioeconomic background. However, ‘graduation of the “best” graduates is not by itself a proof of the “best” education’. Even if the quality of output is taken in to consideration, that is, internal efficiency, measured in terms of academic achievement, success rates, drop-out rates, failure rates, etc., private education does not compare favourably.

It is also argued that as the private sector has to compete with the public sector, the efficiency of the former and, equally important, the efficiency of all higher education, including public, improve significantly . But in countries where mass private sectors prevail, or in countries where

private sectors play a peripheral role, there is little scope for competition, and as a result, the private sector may turn out to be very inefficient, and even economically corrupt. Thus the arguments on efficiency and quality of private higher education do not withstand any close scrutiny.

Secondly, it is widely believed that graduates from private universities receive higher rewards in the labour market in the form of lower unemployment rates, better paid jobs and consequently higher earnings . In short, the external efficiency of private higher education is argued to be greater than public higher education, which would explain the growth of privatization. But the empirical evidence does not support these assumptions. Unemployment rates among graduates from private universities are generally higher than those from public universities in many developing countries. Estimated rates of return, a summary statistic of the external or labour-market efficiency of education show that public higher education pays better than private higher education. (Jimenez and Tan, 1987).

Some argues that private institutions provide considerable relief from financial burden to the governments, as they are self-financing. But as well known, most private institutions are not totally private, at least from a financial standpoint. They receive huge subsidies from the state. It is not only state-aided private institution, but also other private education institution receive subsides-hidden subsidies in the form of land and material at confessional rates, tax exemptions etc. In all, private institutions do not provide any relief to the government in the form of saving of public of resources. If there is any relief to the government, that is very small, and there is no relief to the people, as these institutions charge huge amounts as fees. Rarely private institutions make any investment of any significant magnitude from their own sources.

Fourthly, it is felt that the private sector responds to the economic needs of the individual and society, and provides relevant types of education. In most countries, private higher education institutions offer mainly low capital-intense disciplines of study. It is true that not only are there few private universities involved in research activities, but they are also involved in providing cheap commercial and vocational training as in the case of several Latin American countries, or in the case of 'parallel' colleges in Karalla in India (Nair and Ajit, 1984). When the potential for economic profit is high, the private sector entered into professional fields and opened engineering and medical colleges, as in India many with poor infrastructure (Kothari,1986). On the whole, research and broad educational needs of the economy are barely served by the private sector.

It is also claimed that private higher education can improve equity in education, by providing access to many more students, who, otherwise, would not have gone to higher education. It is important to note that private universities are created mainly to protect the 'elitist' character of education, and to keep the masses away from higher education. As private institutions outnumber the public institutions over the years, the government feels no need to establish new public universities, and as a result, the weaker sections of the society would get permanently marginalized.

Some argue that privatization of higher education improves income distribution, as public funding of higher education, with all its 'perverse effects' is generally found to be regressive (Psacharopoulos, 1977; Blaug, 1982). Again, systematic research has shown that it is not true. As evidence from Japan, one of the few countries to have carried out elaborate investigations on this issue, shows, public universities seem to have higher redistributive effects than private universities in transferring resources from the top income quintile to the other. In many countries, the growth of privatization can be attributed largely to the failure of public universities, while private universities have certainly made positive contributions. Private universities in some countries, such as the United States, have contributed in important and unique ways to diversity, independence, quality, efficiency and innovation (Breneman and Finn, 1978, p.6). In countries like Japan, each private university has its own identity, tradition, culture, etc.

In contrast, public universities hardly offer any diversity or individual choice. In this sense, privatization increases the possibilities for individual choice in the type and quality of higher education.

The goals and strategies of the private sector in higher education are on the whole highly injurious to the public interest. First, the private sector has turned the 'non-profit sector' into a high-profit-making sector not only in terms of social and political power, but also in terms of financial returns, and as profits are not allowed in educational enterprises in several countries, private educational enterprises have resorted to illegal activities in education. When governments attempted to regulate profits by allowing state subsidies and restricting fee levels, all the private institutions found they had one thing in common-a demand for subsidies. In the first instance, state subsidies eased financial crisis of the private universities, as in Brazil, and in the long run contributed to 'private enrichment at public expense'.

Secondly, by concentrating on profit-yielding, cheap, career-related commercial studies, the market-oriented private universities provide vocational training under the name of 'higher education' and ignore 'broader higher education'. Private universities also totally ignore research, which is essential for sustained development of higher education.

Thirdly, by charging high fees, private institutions create irreparable socio-economic inequities between the poor and rich income groups of the population. Private education is 'socially and economically divisive' (Psacharopoulos and Woodhall, 1985, p.144). Access to higher education by lower income groups is negatively affected by the rapid growth of privatization.

CONCLUSION

This paper reviewed the level of development of higher education, and then critically examines some of the widely held presumptions on the relationship between higher education and development, including human development and reports significant effects of higher education on development. It demonstrated that no nation that has not expanded reasonably well its higher education system could aspire to achieve high level of socioeconomic transformation.

The paper also reviewed world experience with privatization of higher education and explained some arguments about private higher education. Higher education systems which are predominantly private, may not produce significant economic pay-offs, and certainly will not be able to contribute to the transformation of the developing economies into advanced economies. The role of the state is very important in providing and financing education everywhere. Excessive reliance of the governments on private sector for the development of higher education may lead to strengthening and even produce new inequalities, besides adding to the problem of quality. On the whole, it seems that initial government investments on a large scale are important in higher education; but only after some time, and certain level of educational and economic development is achieved, private sector may or can complement the state efforts in higher education.

Comparing the experiences of several countries, one may conclude that these policies succeeded only in those countries that have invested heavily in education, including specifically higher education . The converse is also true. These policies could not yield good results in those countries that have made low and inadequate levels of investment in higher education, reflected on low levels of educational levels of workforce, as in countries in South Asia, and also in Southeast Asia like Viet Nam, Laos, Cambodia, etc., and many countries in sub-Saharan Africa, compared to the countries in East Asia.

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Embedding Indigenous Content into Qualitative Research in Psychology in Reflective Case Studies: A Case for Social Change

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ABSTRACT

Australian universities recognise cultural competency as an essential attribute for graduates. Within this context, The Australian Psychology Accreditation Committee (APAC) has enforced requirements for students within psychology programmes to have access to Indigenous content. Though Indigenous participation rates are low, the inclusion of Indigenous content or what is often labeled 'Indigenous psychology' acts at least as a symbolic gesture and important step forward in reconciling the massively disadvantaged position of Indigenous Australians. However there is little to date in that way of guides to help develop appropriate teaching methods to include such content more substantially in programmes. This paper reflects on embedding Indigenous issues and content within curriculum of qualitative research methods. While all content areas can or could include Indigenous content, the teaching of qualitative research methods has enormous capacity to bring Indigenous content to life for students. First, a general argument for the inclusion of Indigenous content within the qualitative research methods curriculum of psychology is suggested. Second, several case study examples of teaching praxis including Indigenous content are provided. Finally, evidence on the utility of such examples for students in learning about Indigenous peoples and key processes and skills for working with Indigenous communities from student feedback are discussed.

Keywords: Indigenous Australians, Qualitative Research, Cultural Competency

"a powerful tool for learning more about our lives and the socio-historical context in which we live" (Merriam, 2002, p. xv)

PSYCHOLOGY, INDIGENOUS CONTENT, AND CULTURAL COMPETENCY

Australian Indigenous communities have extremely rich cultures as some of the oldest surviving cultures in the world, but contemporary survival, especially in remote localities, is subject to immense pressures due to a range of macro social, economic and cultural pressures (Milroy & Koposar, 2005). In terms of spatial distribution almost a third (30 percent) of Indigenous people live in major cities with a further 20 and 23 percent living in inner- and outer-regional areas respectively with over a quarter (27 percent) of the population in remote (9 percent) or very remote (18 percent) areas (Wensing, 2007). Indigenous populations are growing with (Australian Bureau of Statistics, 2001) showing 410,000 (2.2 per cent total Australian population) the 2006 Census shows numbers of 455,000 (2.3 percent total Australian population) (Australian Bureau of Statistics, 2006). However the majority of communities continue to occupy a secondary position within Australia and this is reflected in a whole host of socio-economic indicators including: health welfare dependency, incarceration, housing, unemployment and, educational attainment (Guilfoyle, 2006; Holman, 2005; Sinnott & Wittman, 2001). The severity of this disadvantage is poignantly reflected in the average life expectancy amongst people which has been described as 'third world'. On average male and females can expect to live to 59.4 and 64.8 years old respectively. This contrasts with 76.6 and 82 years amongst non-Aboriginal Australians – a 17 year difference in life expectancy!

Strategies for social change to reduce these inequities can include greater public educative exposure about the plight of communities and action based research with communities in which their real concerns for change can be heard, documented and acted upon. However Indigenous people are suffering from research fatigue (Coffin, 2002) and historically, research has been viewed with due suspicion because it imposes external agendas onto communities. Ironically, whilst research is still needed it is imperative to identify how communities feel about participating in research in order to develop better research into the future. Thus we need to better align our research methods with the needs of communities if we want research graduates who can work with and engage communities. Clearly this strategy requires a work force, both Indigenous and non-Indigenous, skilled in ways of creating cultural secure (Coffin, 2007), participatory dialogue and processes for working with communities who define their own problems and approaches to change (Guilfoyle, Coffin & Maginn, 2008). The argument below is for one path in training professional psychologists interested in promoting social change within communities along these lines. Embedding 'Indigenous Psychology' in qualitative research methods teaching is one way.

Australian universities recognise cultural competency as an essential attribute for graduates. Despite critiques of the monoculturalism of Australian psychology (Riggs, 2004), deeper assertions of the 'cultural malpractice' of psychology generally (Hall, 1997) and calls for a socially and culturally relevant psychology (Riggs, 2004), little has changed for Indigenous communities. Indigenous issues remain at the margins within psychology pedagogy and practice. Within this context, the Australian Psychology Accreditation Committee (APAC, 2008), which controls the accreditation of all psychology courses across Australia, has, rhetorically at least, enforced requirements for students within psychology programmes to have access to Indigenous content. Though Indigenous participation rates within university generally, and psychology specifically, are low, the inclusion of Indigenous content or what is often and problematically labelled 'Indigenous psychology' (see Ranzijn et al., 2008) acts at least as a symbolic gesture and important step forward in reconciling the massively disadvantaged position of Indigenous Australians.

However, there is little to date in that way of guides or appropriate teaching methods for the inclusion of Indigenous content in ways relevant to the profession of psychology (Ranzijn et al., 2008). One of the earliest examples described the process and initial outcomes of incorporating Indigenous and cross-cultural content within a standalone psychology unit (Sonn et al., 2000). Importantly, a team has recently embarked on an ongoing project called 'Disseminating strategies for incorporating Australian Indigenous content into psychology undergraduate programs throughout Australia'. To date, the team has produced a website (www.unisanet.unisa.edu.au/pia), workshops and conferences, and several publications devoted to documenting the development of curriculum guidelines and a preliminary analysis of student responses (e.g., Ranzijn et al., 2006; Ranzijn et al., 2008). They want to provide some scaffold and their argument is for the inclusion of Indigenous content systematically across any given psychology program, within foundational units and/or by placing content within all units.

This paper doesn't depart from the suggestions in Ranzijn et al. (2008) in the sense of the more the better, but argues while all content areas can or could include Indigenous content, including worked examples of (both successful and unsuccessful) qualitative research with communities within qualitative research units provides the following:

1. An immediate foothold for Indigenous content by embedding it within an existing or at least emergent structure of units; which are already partly or wholly present within most contemporary psychology schools and departments.
2. An embedding of content into a space where underlying foundations and assumptions can be culturally secure.
3. Creates a cultural competence for social change. This is twofold. First equipping students with cultural competence through better understanding about the social issues facing Indigenous communities and simultaneously building culturally competent skills for applied research with Indigenous communities to address the very same issues.

THE CASE FOR EMBEDDING INDIGENOUS CONTENT INTO THE QUALITATIVE RESEARCH METHODOLOGY CURRICULUM

Without space to fully make the argument about how the teaching of *specific* qualitative methodologies/methods can act as catalysts for the three points above, the author is illustratively quite broad and sweeping here in the use of the word 'qualitative'. Clearly some methodologies are more suitable than others and some are often applied far better than others. The aim here is to begin a dialogue for future arguments grappling more intricately with how qualitative research methods can be applied. In the general sense therefore (and temporarily idealistic perhaps), the point is that the collected advantage of qualitative methodologies as context for Indigenous content is, by and large, they share core foundations which can align with culturally secure ways of doing research. These foundations are expressed in a range of contemporary methodologies, under epistemological positions of constructivism / subjectivism (Crotty, 1998). Suffice to say; often the primary advantage of qualitative approaches is their shift from objectivism. Thus one path to describing qualitative values (one we use in teaching praxis) is to cite its core values in juxtaposition to the post- positivist framework which historically poisoned communities as objects of research, with the researcher separated from participants as an expert, and with an aim to identifying universal therein, one size fits all truths.

[dump stuff in core values of qual research social constructivist, participation, equal researcher and participants, voice, multiple truths, looking at context, lived experience, meaning, getting to where people in situ, ethics, interviewing,]

By including Indigenous content in teaching it is hoped to demonstrate some shared 'qualitative' core values in operation within contemporary best practice expression and applications of foundational epistemologies of constructivism and subjectivism, and theoretical frameworks dating to Hermeneutics, Phenomenology, Symbolic Interactionism, Post-structuralism, Critical Theory, Postmodernism and the more recent pragmatic and advocacy approaches. Examples are provided from within interpretive communities of researchers applying methodologies drawn from and adapting these frameworks including Discourse Analysis, Phenomenology, Narrative, Case Study, Ethnography, Grounded Theory, Participatory Action Research and of their adapted methods of data collection, analysis and presentation of culturally secure findings and interpretations.

The aim is to show (teach) how culturally secure core principles can apply through these various methodologies when working with Indigenous communities. That is, to teach these within some key principles of qualitative research and demonstrating how they powerfully apply in concrete settings. This is through reflective case studies which describe a particular research project or issue and how qualitative research, designs and methods apply in that context. Thus both examples of the conditions faced by communities can be highlighted, the way that research can help unpack and create change for these and skills needed by researchers to work within these communities at the level of values, research methodology or design or methods.

Often successful adaptations of qualitative research designs that work to explore Indigenous communities' interactions with allied health services can be illustrated. For example a Grounded Theory design (particularly that following Charmaz, 2006) can help to develop theory suited to Indigenous communities' definitions of service needs or indeed definitions of health and well being (Guilfoyle & Guilfoyle, forthcoming) per se. Phenomenological and Narrative research can be applied to report the authentic lived experiences of community members or collect stories of members of Indigenous communities as they interact with health services. The aim is to better service communities based on 'real' experiences/stories documented. Critical Case Study and Ethnographic approaches, or their borrowed methods of participation and observation, can help report on the unique meaning making systems and webs of cultural practices of various communities in order to develop services tailored to the unique needs of communities. Studies of Discourse can aim to better understand the

exchanges both within communities and those of stakeholders with invested interest at all levels and, more importantly, critically observe the interaction of these discourses to examine how Indigenous communities are best positioned to create change.

In particular, at least for illustration, Critical Participatory Action Research (Guilfoyle et al., 2008) is advocated. Participatory Action Research (Stringer, 1999; Kemmis and McTaggert, 1998; Reason, 1994, 1998; Reason and Bradbury, 2006; Schmuck, 2006) is a qualitative research methodology with a dynamic and powerful potential in both rural and urban contexts. This methodology when applied well and critically, can account for social forces and macro systems of injustice which affect the lives of people within a community and thus achieve using this methodological frame demonstrate processes for ensuring the community identifies, defines and owns the research concerns and, are an excellent basis to show case qualitative research, with all its strengths and utility. Examples of where this sort of methodology has been applied successfully, can directly illustrate for students not on a useful research strategy, but the current plight, issues, concern needs for change that are being defined by communities themselves. It should be noted even if in fact there are to date very few ideal examples of this community ownership of research – we have a reflective, rather than a stopping point. Here we can illustrate to students the value of and need for more genuine qualitative research approaches which do achieve community ownership and definitions of the problems and need for change. We might, through such examples and commentaries, inspire future cohorts of students willing to develop and apply such approaches better, and achieve genuine participatory-action-research.

One of the shining aspects of a Critical Participatory Action Research (when it works well, and these moving parts will be discussed elsewhere) is topics arrive from the community per se (rare to date but not unachievable) or are very much defined or re-defined by the community (Guilfoyle et al., 2008). After all how we define the problem will shape the solution, and for Indigenous communities for too long both the problems and solutions have been imposed by the agendas of researchers (see Davidson et al., 2000; Fielder et al., 2000; Gridley et al., 2000; Hall, 1997; Milroy & Koposar, 2005; Smith, 1999). It is argued that we can shift beyond this real, common and disempowering state of affairs, by teaching qualitative research methodologies, where students learn about the protocols and processes for the consultation with key people in developing qualitative research projects and for working with or alongside communities on problems communities define. Thus at the level of teaching methods it can be shown through reflective case studies of past Action based projects how key issues in qualitative research process, ethics and sensitivity in defining of research problems, data collection and methods of gaining participation, ways of collecting data, analysing data and verifying, as well as presenting and distributing findings and interpretations, can be applied in ways that secure community ownership. This is not researcher as expert, separate from the community, but researcher as community colleague and learner.

Let's examine some reflective case studies used in the current teaching praxis. For the flow of argument here the focus is narrowed to some examples illustrating purposive sampling principles and practices as they have been applied within the consultative and participatory processes of our qualitative research projects.

REFLECTIVE CASE EXAMPLES

The Reflective Case Study used in teaching 3rd year undergraduates in the unit 'Research Methods and Ethical Issues' at Edith Cowan University, builds on work of completing a Commonwealth Government funded project: Towards an Indigenous Child Care Plan. This study has been used to illustrate a range of methodological process such as purposive sampling (n = more than 350 community members in communities across the nation), team projects, ethics, data analysis, and particular issues surrounding reporting of findings, and the need for highly inclusive consultation in design or projects. The first phase of the Participatory Action Research project was aimed at a preliminary validating of the dimensions and protocols for the interviews with a local reference group.

The research team was confronted firmly and directly: "All I see is a sea of white faces sitting here. This is about our kids. We should be doing this project not you". The member had a highly valid point. She had not been included in the original grant submission. Further had she been, she would have outlined her concern that communities desired Indigenous-centred approaches to child care rather than mainstreamed provision by mainstreamed services and she knew, and was ultimately proved right, that the government of the day had intended the agenda (unbeknownst to us as researchers at that point!) as one of 'mainstreaming'. For her this meant the basic human right to define how to care for one's own children was denied. She argued the 'research problem' should have had a basic community definition rather than being imposed on the community vis-a-vis the government's agenda and we indeed have to question our role as researchers inadvertently complicit in this. We outlined the research funding process and how her views and the views of any other participants we spoke to, would appear in our report (and indeed how we could collaborate in future projects to help her community apply for the funds). Including the views of community has meant that only now (3 years on and a new government) has the government agreed to release some contents of the report. The story of this project has acted as a powerful catalyst to illustrate to students not only the political macros surrounding research but the need for full community consultation before a project, small or large, gets off the ground. Sometimes we can highlight good process by the shadows of bad process!

To move to a micro level, culturally competent skills sit side by side with the practicalities of purposive sampling. In one teaching case study we use Juli Coffin's description writing in Guilfoyle, Coffin & Maginn (2008) when reflecting on her involvement in a project to support community based nutrition (Miller et al., 2004). Juli describes her need to sample carefully *by creating* a 'mind map' of each of locality detailing each family and/or language group. Her next step was to identify the culturally secure contact within each group. In speaking to this person issues around inter-racial feuding or relationships was duly recorded as these matters have implications on finding a unified voice and representative speakers. Evidence, or suggestions, of what Juli suggests we might term 'nepotism' which excludes some members from getting involved were also recorded. She reports that this entire process took several months and many cups of tea. More importantly, as each step had been recorded carefully, clear links and contacts with each group could be demonstrated if there were any questions from communities about certain groups being overlooked or missed. Thus participation is achieved, when researchers utilise cultural protocols to ensure and demonstrate transparent and valid process to the community involved. To sample properly in this context required the researcher to both know and be in a position to make, the appropriate initial contacts and to fully reflect on all factors affecting who will participate in the project. Not to mention, the need for researchers whose competence comes by dedication and want to map and represent all potential participants. It is good example of the power of well applied qualitative sampling.

Opportunistic and 'snowball' sampling are requisite for many designs and are recounted to a second year cohort through a project in the remote areas of Western Australia (Kimberley Sexual Health Project: Bolger, Guilfoyle, Hunter & Ejai, 1998). In this case study the process by which a cultural mentor facilitates sampling is highlighted. The mentor arranged all talks between the researchers and each key Elder from 42 family groups, with some Elders acting as official proxy for others. Once the agreement was reached the mentor put the word out and contacted researchers whenever outlying community Elders were in town and arranged meetings with them to gain their consent. Word of the project spread through the ongoing interviewing process and other informal networks across the consenting communities over several months. Thus on a walk home one night one of the research team was approached by a young man who stated something like: "Hey! You are that sex fella aren't ya"?. The young man suggested he had heard about the project through various networks and then at this point voluntarily detailed in rich terms the effects of having an STI infection and the acute problem of having no culturally appropriate medical service to attend. Not only does the case study serve to show that all key stakeholders must provide consent before any sampling occurs, but that natural networks within the community spread the word about the project. It also illustrates the idea of immersion in the field. Qualitative researcher's to varying degrees, depending on their research design, populations, will

sometimes need to spend sufficient time engaged in the community to know those networks and develop a process where participants are conformable to make an approach.

Teaching ethical issues properly, we need to go beyond mere descriptions of procedural ethics and illustrate to students ethical process which involves adapting our methodologies as well as our behaviours and practices contextually to suit the participants per se. Thus the following reflective case study is used in present teaching practice to illustrate a process of appropriate 'approach' within qualitative sampling. Good qualitative research means awareness of the particular norms and values of the participants. This case study is again based on the work of Juli Coffin in the Aboriginal Stroke Project Steering Committee (2004) reported in Guilfoyle et al., (2008). Juli suggests that within some Indigenous cultures people may be offended when the name of a deceased person is mentioned or when a male or female enters a gender specific space (called Men's country or Women's country). If after being made aware of the protocol a visitor once mistakenly uses a name or enters an inappropriate area, but makes an effort to apologise then culturally s/he has made the proper acknowledgement and shown respect. If, however, the visitor has been told on many occasions about a particular protocol, but does not abide by it, the entire community is affected and would no longer want to engage with such a person. For some communities protocols include: "no respect shown, none is returned" and basic cultural oversights or transgressions will antagonise cultural security, putting the whole community offside before a project has achieved engagement. The case illustrates on one level quite directly the cultural norms that resonate within one Indigenous community and the broader point that researchers must be prepared to *both* learn and, abide by, the precise norms of any communities they engage with.

'Member checking', or roughly speaking, having interpretations qualified by research participants, is one prized validation process for many qualitative research methodologies. One case study used in current teaching practice shows this research process alongside the powerful nature of qualitative data analysis. An interview with an Aboriginal Elder (Guilfoyle et al., 2008) had recorded the following statement: "I know who you are I know why you are here (a long pause and) make sure there is shady tree'. In reflections with a cultural mentor, 'pencil circling' this exchange in the notes, the mentor suggested to the researcher that what the Elder was saying was that the shady tree was metaphor, a reference to an open area in which a new medical service should be located, as it provided less potential 'shame' or stigma of attending the clinic for treatment. It was a space where people could wait without feeling embarrassed, and could easily exit if they felt they needed to. It meant the service should be functional, as is a shady tree in the hot sun of North Australia. It was a space which was neutral, transitory, a walk through space used by all in the community in their daily activity. The suggestion was that a new health service must, in the first and last, be a place where people are comfortable. Metaphor (Lakoff and Johnson, 1980) of course is a powerful, often not well used, method for analysing qualitative data. In our experience students of qualitative research hearing this case study readily take the points about the process of member checking in reflexive interpretations and the utility of qualitative data analysis in finding new ways to think about service provision for communities.

Examples which refer to research with Indigenous communities can demonstrate powerfully, and in some cases extremely, key points for reflection about applying qualitative research methodology and processes are argued. These serve not only to teach about qualitative research and skills it requires, but to develop a cultural competence in understanding more about the concerns of Indigenous communities. It should be noted the above examples are not to imply that Indigenous communities concerns are negative, our experience is one of highly positive working relationships with communities and great learning about the ways that communities work towards creating positive change, and there are many examples of this to share with students.

DOES IT WORK? STUDENT FEEDBACK FOLLOWING 2ND AND 3RD YEAR QUALITATIVE RESEARCH LECTURES IN PSYCHOLOGY

Students were emailed the following question: We are always keen to collect feedback to improve teaching style, process and content. If you have a spare minute and feel comfortable emailing, could you email me your thoughts? Please comment on any aspect of the qualitative component or the unit generally.

At a general level, the students responded positively to the Indigenous issues which were included in the presentation of the qualitative research material and, connected the two quite seamlessly. For example, one student commented, 'I enjoyed this unit, and found your examples on working with indigenous communities very useful' while another stated, 'I really really enjoyed the qualitative side of the unit. I gained a lot of useful knowledge about it and Aboriginal people and learnt a lot. I thought that your examples about doing research with Aboriginal communities that you used were so relevant and interesting'.

The students also reported specifically on gaining a greater understanding and appreciation of qualitative research. For example, one student reflected that 'I think qualitative research is essential for psychology to understand the deeper meaning of human interaction, thinking and decision making especially within cultural groups and all of the vulnerable members of our society'. Some students were left wanting more information on both qualitative research and the issues facing Indigenous peoples and communities. One student suggested, 'I really enjoyed your qualitative component of the unit and definitely feel there should be more focus on it after three years of mainly quantitative' and another stated 'I would be interested in learning more about Aboriginal culture and issues. I look forward to hearing more from you next year'. Some students commented positively on the use of real-world examples. For example, 'thank you for all of your personal anecdotes, they were very enjoyable!' and 'I did think that your examples were very useful to my understanding of research and the complexities of working and researching issues that affect people who may be labelled as part of a minority group. I am glad that your examples were about something you are passionate about.'

Importantly, the students were informed in a relational sense about the social position of Indigenous communities and the concerns of these communities. One student wrote that the content 'did increase my knowledge and appreciation of experiences and issues facing Aboriginal people and conducting research with vulnerable populations' and another stated 'the lectures on how to do research made me look a lot further than I may usually'. The potential for social change of the cultural environment through the reflexive nature of the case studies is evident when students stated that the content challenged some of their biases and preconceived ideas about Indigenous people. For example:

> I was surprised at the level of increased appreciation I gained for the plight of Aboriginal people from completing the course. I found the qualitative process really helped me to take to take the perspective of others, and was surprised to discover plenty of my own biases along the way even though I have always strived to be a fair and kind person! I really believe this process has provided me with a great deal more insight in this respect…

Finally, and of great interest is any potential for instrumental change through building capacity was evident when several students commented on that the examples of doing research with Indigenous communities helped them see how they might use their applied research skills in the future in order to counter the disadvantaged social position of Indigenous communities. For example, one student described, 'Prior to your lectures I was not fully aware of the opportunities available to conduct such research and work with Indigenous communities and I am seriously considering it as a field that I would be interested in' and another asserted, 'Doing research with Indigenous people is actually something I'm really interested in. I was wondering if you might be able to suggest pathways I could/should take if I wanted to work in this field in the future?' All the feedback received was positive? What we don't know is the extent and impact of student discomfort and impact of being

challenged, which has been reported elsewhere (e.g., Gerrett-Magee, 2006; Rademacher, 2006; Sonn et al., 2000).

In sum, the data indicate that the students gained an appreciation of the processes and complexities of qualitative research and the issues affecting Indigenous communities, and some were keen to develop their skills and knowledge further.

CONCLUSIONS

Thus it is suggested that by embedding Indigenous content into qualitative research methodologies in psychology at least four outcomes can be achieved:

1. A description of the theories, methods and applications of qualitative research for students in concrete terms;
2. Informing students about the social position of Indigenous communities and the concerns of these communities;
3. Equipping students with understandings, skills, research tools and ideas that they might apply as professionals to counter the disadvantaged social position of Indigenous communities;
4. An appreciation of the need to be culturally competent generally.

Of course symbolism is good and embedding Indigenous context can act symbolically as a positive gesture as suggested by Ranzijn et al., (2008). We do need more than symbols though, and Linda Tuhiwai Smith suggests "It is one thing to get the foot in the door, another to have it remain there, and yet another to then communicate and interact with those on the other side" (Smith, 1999, p. 145 in Sonn et al., 2000). At this stage the discipline is tentatively towards openings for Indigenous content, however to create a strong flow with doors fully revolving we will need to look at how we can structurally support such programs.

As the rhetoric shifts to reality in structural support for programs what can be achieved are reports by individuals who have found ways to include Indigenous content into their teaching units. It is hoped that this paper is one which can invite a dialogue of published case examples to document where this is occurring successfully or otherwise. Ideally, Indigenous issues could and should be included in other and all content areas of Psychology, in this paper it is hoped to provide some examples of how to make a start.

Programs that are not deeply embedded face constant jeopardy. The author is not Indigenous and does not represent the concerns of the rich and varied Indigenous communities in the nation in any way (the first case study evidenced this!), other than by citing collaborative research. As others have argued before now (e.g., Ranzijn et al., 2008), it is argued for the embedding of Indigenous psychology in qualitative research methodologies to be fully secured and functional, the voice of Indigenous community members and researchers as guest speakers in lectures is the essential. These are *the* speakers positioned to talk about Indigenous communities concerns and how the broader sectors of the community can support research for the social elevation of communities. A case for change through reporting contemporary research projects (and ones that failed reported alongside reasons for the failure) to current students has been outlined. The broader aim was opening this idea up to dialogue. The problem with non Indigenous reports of research is whether these reports themselves are culturally secure, the reports here are of research with collaborative Indigenous partners, but that alone is no assurance, and this point needs further debate. We also need Indigenous students embedded in Universities, and without strategies for social change in attracting and supporting Indigenous students our future is without leaders who can guide optimal research and teaching praxis.

In aligning qualitative research methodologies and Indigenous content, the aim is not to use Indigenous issues as a way of furthering the cause of qualitative research at the expense of Indigenous peoples' issues and concerns. Doing so would be an act of exploitation. Although zealous believers in

the strengths of qualitative research, our primary concern is for social change for Indigenous people. Thus it is argued that qualitative methodologies are useful and perhaps a foundationally 'culturally secure' vehicle in which to talk about concerns of Indigenous communities and to educate students about these. But although education is always a first step, mere description per se does not advantage Indigenous people further. Embedding Indigenous concerns within the teaching of qualitative methodologies does more than give voice to some concerns of communities; it also can equip (more evaluative research is planned on this point) students with a deeper understanding of skills and tools to act in future to assist or support Indigenous people through applied research. In educating students by equipping with skills of qualitative research the hope is that they will find a way to use these skills to realistically, practically and ethically 'do-good' in their communities and this includes helping those who are disadvantaged. Embedding Indigenous content within qualitative research curriculum in psychology is ultimately about creating a basis for action against cultural disadvantage.

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Factors that Influence Successful Online Teaching and Learning Programs in Technical Computer Science Subjects

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ABSTRACT

Since the mid to late 1990s, the World Wide Web has been used as a distributed learning mechanism, enhancing the digital learning environment to support distance and on-campus students. Web technology has been adopted to assist learners with real-time studying at a distance. Consequently, Web delivery has grown rapidly and has been used as a vehicle for learning. Many universities have developed wholly online distance education programs. These changes in distance education have been developed in an attempt to provide easier access to educational opportunities for students who are located remotely from the university, who are working or who have other constraints/commitments such as family commitments. However, online distance learning in Computer Science courses remains challenging for both instructors and students. Research has shown that there is a significant risk factor for online courses in Computer Science. Course developers and instructors need to be aware of the particular needs of Computer Science students when establishing online courses, if they wish to graduate successful and satisfied students. This is particularly true in technical subjects where teaching and learning in an online environment is even more challenging. This paper aims to identify the technological and social enablers and barriers to effective teaching of Computer Science topics in a wholly online environment from the perspective of instructors and learners by using the School of Computer Information Science (SCIS) as a case study. The paper reports the preliminary findings of historical enrolment data from SCIS, to determine if the online environment is a major factor in retention rates for online students.

INTRODUCTION

In an attempt to provide a range of equitable educational opportunities for students who are working or who have other constraints on their time, many universities have developed wholly online distance education programs (Hentea, Shea, & Pennington, 2003). Initiatives to connect to the 'power of the Web' as a mode of delivery and to enhance quality and improve accessibility for education and training, is evident around the world (Pye, 2003; Tabatabaei, Schrottner &Reichgelt, 2006), as educational institutions and business recognize the potential educational benefits and the flexibility of online learning (Salimi, 2007; Shelley et al., 2007). Thus, information communications technologies (ICTs) are being used to attract distance education students with the promise of access to a range of up-to-date, learning materials available in a more flexible learning environment (Tanaka, 2005). Research by Allen and Seaman (2005) found that in the United States current traditional enrolments

are occurring at a rate of four percent compared, whereas elearning or online learning increased at a rate of more than eighteen percent in 2005. A similar finding in American Society for Training and Development (ASTD) (Rossett, 2002) estimates that up to forty percent of education is currently being offered online in Australia (Wagner, 2006).

Several factors are driving this dramatic growth in elearning including rapid advances in ICTs and web-based technologies which allow easier access to a range of different learning materials; lower costs for hardware, software and Internet connection; greater access for prospective students irrespective of physical location; and the provision of just in time, flexible and independent learning programs (Gulatee & Combes, 2007). However, previous findings indicate that many of these initiatives have had mixed success (Zemsky & Massey, 2004). Emerging research also indicates that studying subjects online may be problematic because online programs are often designed without attention to human-computer interaction. HCI is a branch of science concerned with studying the interaction that occurs between human users and computers. However, HCI is much more – it is also about the interaction that occurs between human users and the system, the network and the virtual spaces/environment delivered via the computer screen (DePaula, 2003). When studying online, the virtual environment and how students interact in and with this environment, presents barriers to student engagement. This is particularly true in technical subjects such as programming languages, where teaching and learning in an online environment has proved to be very challenging (Gulatee & Combes, 2006). Many Computer Science subjects are highly technical in nature, which may be more difficult for students to learn independently when working wholly online. This paper presents the preliminary findings of a larger research project which examines the social and technical barriers to the effective teaching of Computer Science topics particularly technical subjects, in an online environment.

BACKGROUND

In the wholly online environment the student is physically isolated. None of the body language and ready/immediate access to the instructor's knowledge at the point of need is available. A major problem with teaching Computer Science topics on the Web is the lack of direct interaction in teaching and learning activities and immediate access to the instructor and peers. Matzen and Alrifai (2006) found that forty-five percent of the students in their research agree that it is more difficult to teach Computer Science on the Web than most other disciplines, especially introductory programming. Students working online in isolation suffer from feelings of anxiety, lack of confidence and frustration (Combes & Anderson, 2006). The nature of the online environment means that students requiring immediate assistance to correct a misunderstanding may not receive it, especially where asynchronous communication is being used as the primary method for feedback. Since asynchronous communication methods are a major component of the flexibility valued by online students, this lack of opportunity for immediate feedback is a major issue, especially in technical subjects (Gulatee & Combes, 2007). Other research by McSporran and King (2005) also supports the idea that cognitive development does not occur in isolation. Therefore, the online environment itself presents barriers to learning highly technical subjects such as computer programming. As a result, programming students are at significant risk of failure or leaving the course when attempting to study wholly online (Hentea, Shea, & Pennington, 2003).

Research by Jehng and Chan (1998) indicates that teaching and learning computer programming in traditional, face-to-face classrooms is also problematic. Computer programming is an area that contains complex knowledge and abstract concepts which challenge an individual and require more mental effort to learn and understand. Computer Science programming subjects require students to become proficient in several cognitive abilities including syntactic knowledge, conceptual knowledge and strategic knowledge (Bayman & Mayer, 1998). Deek and Espinosa's (2005) research in how students learn in programming courses, found that studying subjects such as programming languages is often more difficult, because the courses have been designed without attention to human-computer interaction. Many Computer Science subjects are highly technical in nature, which may make it harder

for students to learn independently in an online environment. In most Computer Science topics such as programming, the syntax of the language has complex rules that are difficult to learn and understand (Lischner, 2002). Novice programmers often find introductory programming courses frustrating and difficult (Deek & Espinosa, 2005). Consequently, Flowers (2001, p.10) noted that "typical students who take their first online course are often unaccustomed to the instructional techniques and mistakenly assume a passive role". As a result, in online programming classes, students find it more difficult to apply the theory of programming problems than in the traditional face-to-face classroom (Hagan & Lowder, 1996). Students studying wholly online need to develop learning strategies, understand language syntax and utilize their problem-solving skills to solve programming problems creatively or to construct new programs, as well as be able to troubleshoot when the program does not work as expected. Highly technical subjects such as programming languages which are already difficult to teach in traditional learning environments, present additional problems for instructors and learners when provided wholly online, where the added factors of isolation, anxiety and lack of feedback are part of the online learning environment.

TEACHING APPROACHES, COMPUTER SCIENCE AND ELEARNING

Traditional classroom or face-to-face teaching provides students with opportunities to work with experts in their field of study. In a traditional classroom setting concepts become immediate and personal through students' interactions with both their instructors and other students. These traditional interactions contribute a social and emotional focus that gives students a chance to compare themselves in terms of performance, problems and priorities. Traditional classes also give students a chance to benefit from other students' questions, mistakes and insights. In the wholly online environment the student is physically isolated. None of the body language and ready/immediate access to the instructor's knowledge at the point of need is available. A major problem with teaching Computer Science topics on the Web is the lack of direct interaction in teaching and learning activities and immediate access to the instructor. These are issues that need to be considered when teaching programming languages, because these approaches are not often compatible with elearning. Due to the nature of elearning, where students and the instructor are located in different places geographically, it is impossible for the instructor to teach the students on a one-to-one basis as often happens in the programming classroom. The hands-on approach often used by instructors when teaching programming languages is very difficult to simulate in the online environment. When working on programming students need to have instant feedback, opportunities to share information and problem-solving strategies. Programming courses require students to set up software to execute their programs using the available platform provided by the university. If each online student is using a different platform such as UNIX, Windows or Linux, this fact may cause unknown problems or difficulties, even though the students are using the same software. When problems occur while coding the program, the instructor and student may be discussing the same problem, but from a different programming environment, thus creating difficulties in understanding and communication. Thus, teaching units in computer programming tend to use more traditional instructional methods that rely on face-to-face, one-to-one, hands-on learning to cope with the complexity of the subject material. These traditional classroom methods are difficult to simulate online.

THE RESEARCH

Since elearning actually represents a new teaching and learning paradigm, it is essential that educators build on previous understandings to help them appreciate the barriers inherent in the online environment before they can design suitable programs, especially for technical subjects. This research utilized both quantitative and qualitative methods to provide a comprehensive picture of how students approach online learning and how instructors design and teach online subjects. In this research the School of Computer and Information Science (SCIS) at Edith Cowan University provided the test bed for an in-depth case study. SCIS provides online alternatives for nearly all of its courses, with a significant number being offered in mixed mode and wholly online (Anderson et al, 2005).

According to the literature a number of strategies have been suggested to overcome the difficulties of using online as a teaching mode for technical computer subjects such as programming. These strategies include the provision of opportunities for collaboration between academic, technical staff, instructional designers and students to develop learning materials; and courses that meet students' social and academic needs when studying subjects wholly online. Online delivery models should include a range of student resources, facilitator resources and facilitator support. Some researchers also maintain that student resources should include online course material, discussion groups, real time lectures, learning guidelines, textbooks and facilitator notes (Howell et al, 2003). If the technology allows, we could also include low bandwidth images, animated graphics and simulations (simple learning objects), audio, web-based simulations, groupware and multimedia presentations. SCIS has used many of these strategies as a set of criteria when placing Computer Science units online, as well as providing opportunities for staff and students to discuss social and equity issues as part of the development an online learning community. SCIS has also developed a learning culture by the extensive use of discussion forums and chat (Anderson, et. al, 2005). Not only is SCIS an interesting case that demands further investigation because of the above, but as an early and total adopter of elearning, SCIS offers a useful domain for research into the issues associated with the delivery of technical content in both on-campus and online modes.

METHOD

In this research case study method provides an overarching framework for more in-depth research using a range of different data collection techniques to develop a rich description of what has and is happening in SCIS.

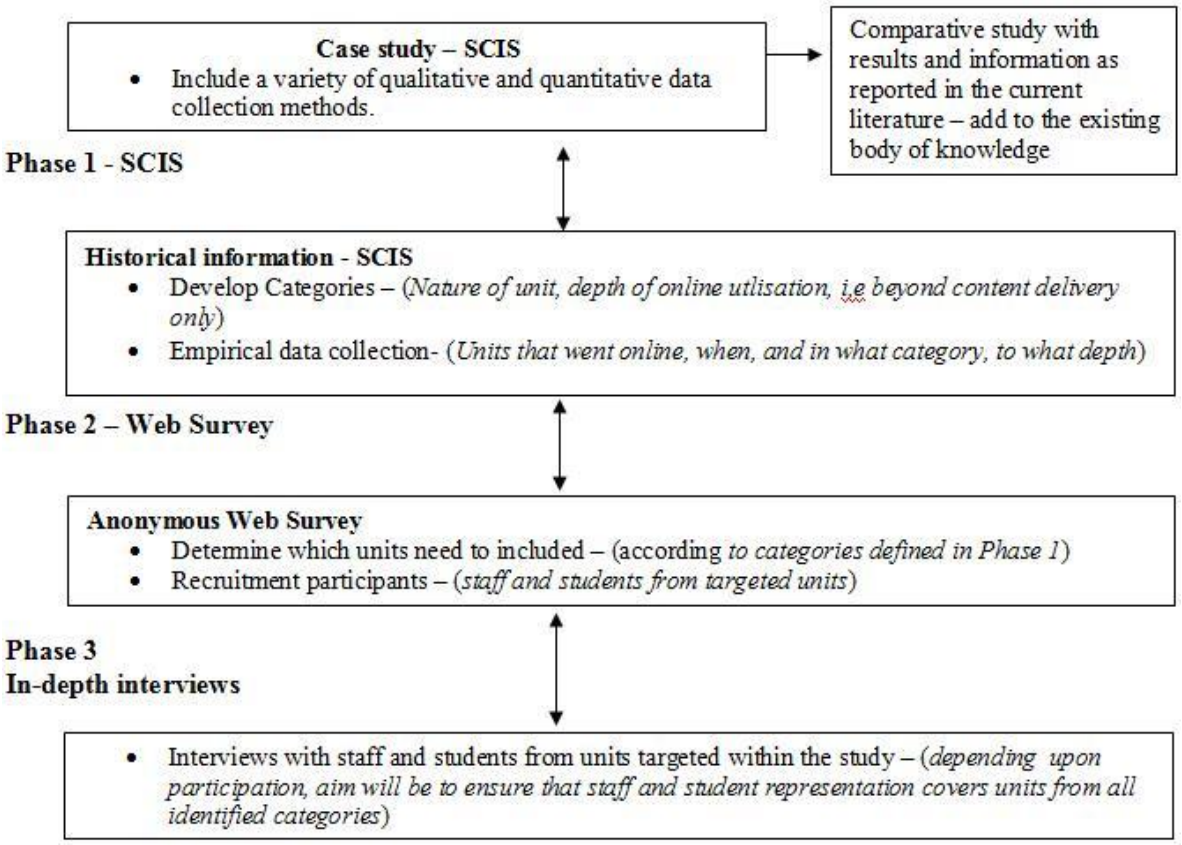


Figure 1: Research Phases

The case study examines whether the technical teaching environment impacts on the Web-based delivery of Computer Science topics and combines empirical research approaches to gather data about those Computer Science units in SCIS that went online first. Categories to define the nature of unit

(unit type) were created and used to establish whether a relationship exists between the delivery mode (going online) and the nature of the subject materials. For example, were the least technical units the first to make the transition to online delivery. Based on best practice for the design of online programs as established in the research literature, another set of criteria were created to describe the content of the online materials created for the SCIS courses. These criteria were then used to analyse the content and establish whether a relationship exists between unit type and the type of content in the units. This data was then used to establish whether technical subjects present more difficulties for staff when creating unit content that represents best practice as defined in the literature. The analysis of this historical empirical data set from SCIS courses relating to the school's adoption of online learning was then used develop two anonymous Web questionnaires, for staff and students. Results from the Web survey were then used to develop in-depth, structured interviews with staff and students who were teaching and studying across a range of unit types in the school. This paper will present and discuss the preliminary findings of the first stage of this research project, the historical dataset relating to the online delivery of programs in SCIS.

Unit Type Categories

To differentiate unit type, a series of categories were designed to describe the nature of units taught in SCIS. These are described in Table 1. The historical data will provide the research with some primary data about the teaching of technical and non-technical subjects in an online environment and may indicate differences between these unit types. This will allow a comparison between unit types using the retention rates and completion rates to determine if unit type is a significant factor. The placing of units within categories was also designed to ensure a level of anonymity for teaching staff, thus removing any concerns that staff were being criticized for their online materials. These categories also enabled the researcher to define the nature of the content in the units and compare the data in each category.

Table 1: Criteria for categorizing units in SCIS

Categories	Criteria
Technical (T)	This category consists of the technical units in which students have to develop a range of technical and practical skills and conceptual understandings, in order to be able to apply this knowledge to different applications and workplace challenges such as programming, database development and artificial intelligence (AI).
Technical theory (TT)	This category consists of the technical theory units, in which students have to learn theory and conceptual understandings in technical skill but not practical skills, for example, systems analysis.
Non-technical (NT)	This category consists of the non-technical application units, in which students have to know how to use the applications but do not have to create the application software by themselves such as Library systems.
Non-technical theory (NTT)	This category consists of non-technical theory units, in which students examine, discuss and apply conceptual theory, for example, Information Society and Information Services management.
Other (O)	This category consists of generic conceptual theory units, for example Research Methods and Research Proposal and applicable Project units.

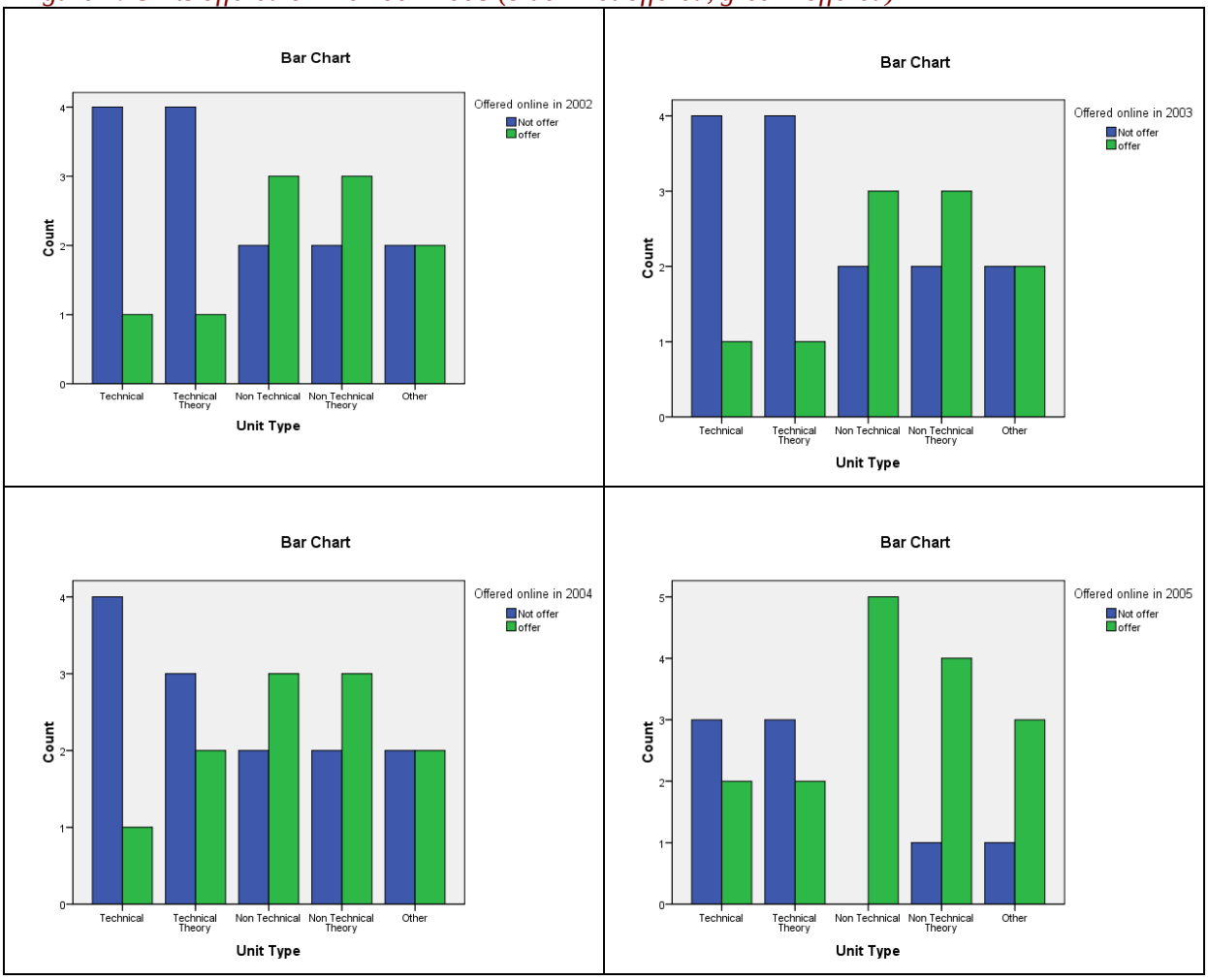
Using the unit categories as a starting point, a separate metric was then designed to classify the degree at which a unit had been developed specifically for the online environment. For example, a unit that merely places content online as text would be considered at the low end of the scale, whereas one that includes assessments aimed at online students, communications, multimedia and groupware tools would be at the high end of such a scale. The overarching premise here is that an online unit which

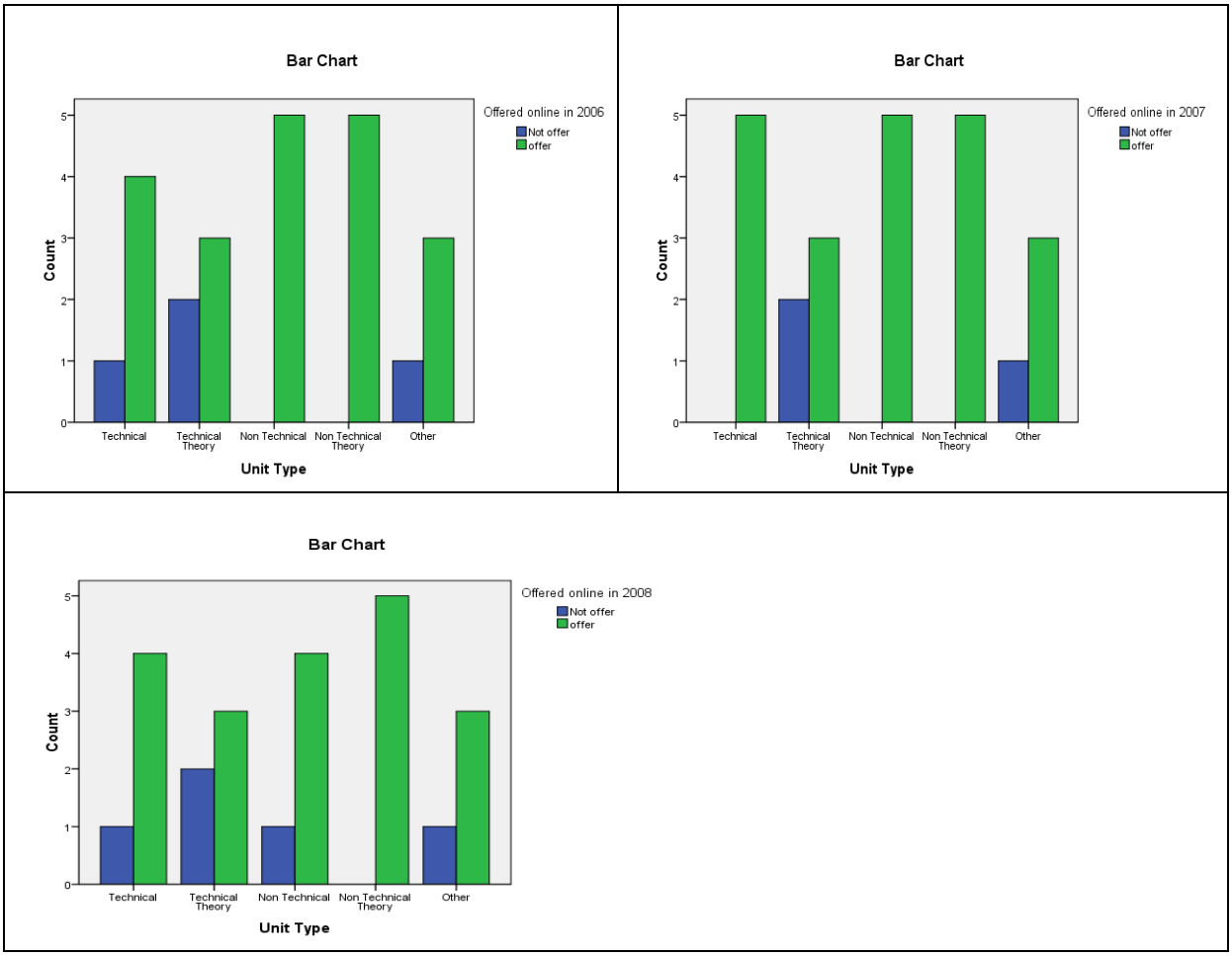
provides a variety of learning materials and formats, and opportunities to interact with the lecturer and peers (ie. a rich learning environment) will be better than one that is sparsely populated and where materials are merely text on screen (Howell et al., 2003). According to the literature, richly populated online units that use different formats and delivery modes, cater for different learning styles and provide opportunities for students to develop further their understandings and skills through guided activities, problem-solving and review exercises. The findings in this paper will only consider the historical enrolment data from SCIS using the above categories, to determine if the online environment is a factor in attrition and completion rates.

FINDINGS

SCIS began offering units online in 2002. An analysis of the historical data found that most of the units offered online between 2002-2005 were classified as non-technical (NT), non-technical theory (NTT) and Other (O) units. Most of the units classified as technical (T) and technical theory (TT) were offered online at a much later date, after 2006. See Figure 2 below.

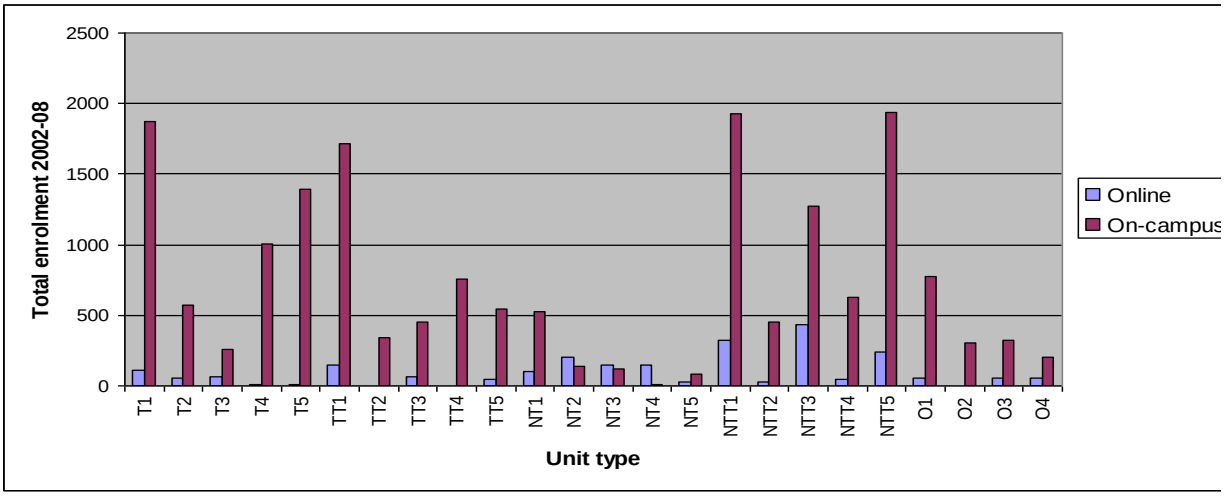
Figure 2: Units offered online 2002-2008 (blue= not offered, green=offered)





Five units from the categories Technical (T), Technical Theory (TT), non-technical (NT) and Non-technical Theory (NTT) and four from the Other category (O) were then studied in depth to determine enrolment patterns, and rates of student completion and student attrition. Figure 3 indicates total enrolments for the period 2002-2008.

Figure 3: Total enrolments 2002-2008



Clearly, students in SCIS prefer to study on-campus for technical and technical theory units, even though most SCIS units also provided materials online by 2006. Non-technical and non-technical theory units attract the most online students. In some cases the non-technical units have higher

numbers of students enrolled online than on-campus. Students' preference for on-campus instruction has been consistently reported in the literature, especially in technical subjects such as computer programming (Peltier, at al., 2007).

Completion and attrition rates for online students for each unit set were also examined. Figure 4 below indicates the total percentage of students who completed and discontinued in Technical Subjects (online and on-campus) between 2002 and 2008. This data clearly shows that the attrition rate for all students completing technical units is high, even when they are studying on campus, and data supports other research findings that technical subjects in Computer Science are difficult for students (Gulatee & Combes, 2006). However, the attrition rate for online students is high across all units except T5, with T4 having an attrition rate that is higher than the online completion rate. It should be remembered however, that online enrolments in T5 were very small.

Table 4: Total completions and discontinued for Technical units, 2002-2008

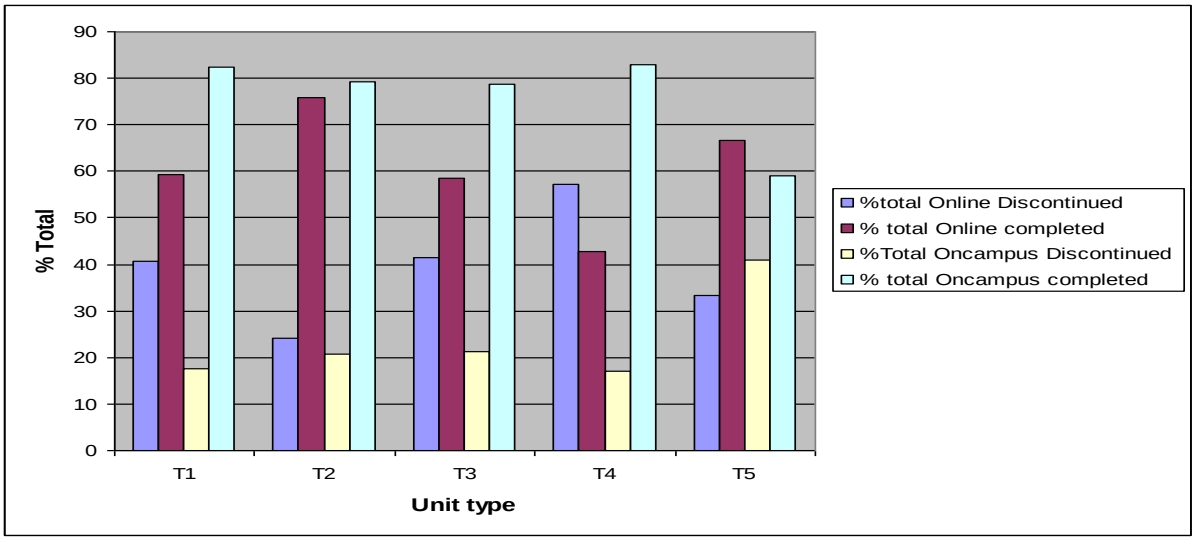


Table 5 for units classified as Technical/Theory also shows a higher discontinued rate for online students. Interestingly, TT2 and TT4 are two examples of units that do not have an online presence at SCIS. Tables 6-8 show the completion and attrition rates for units classified as Non-Technical, Non-Technical/Theory and Other for 2002-2008. Again, the attrition rate for online students is generally higher than for students studying on-campus. Although other factors are undoubtedly involved here (age of students studying online, access to technology and work/family commitments) which may influence attrition rates, all of these datasets may also indicate that it is the online environment that is a predictive factor that determines the successful completion of a unit. In table 6, NT4 is only offered online and is a core unit, so students must compete it, hence the high completion rate. In table 7, NTT4 has only been offered online since 2006 and has had very low numbers of online students. It is also a core unit for some of the undergraduate degree courses in SCIS.

Table 5: Total completions and discontinued for Technical/Theory units, 2002-2008

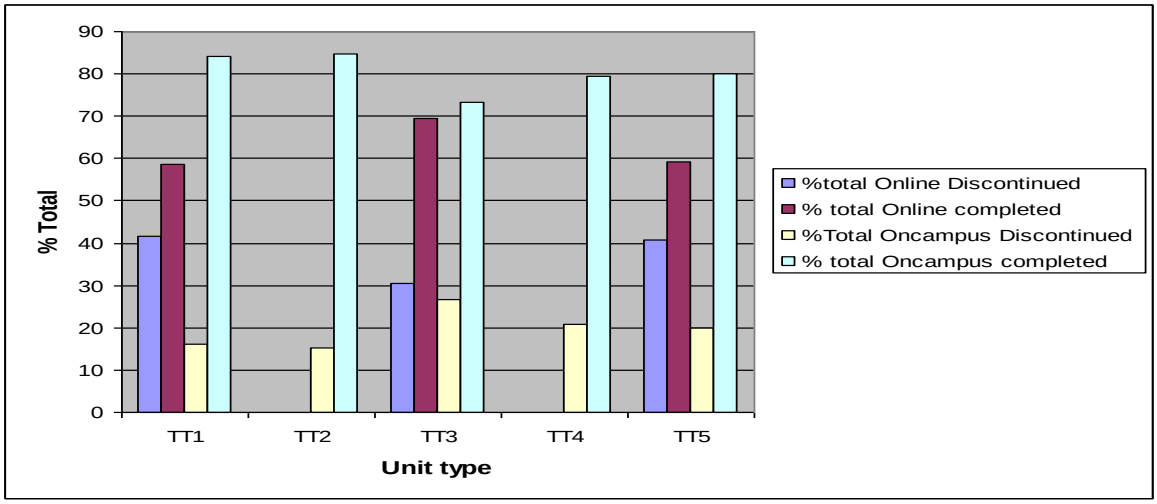


Table 6: Total completions and discontinued for Non-Technical units, 2002-2008

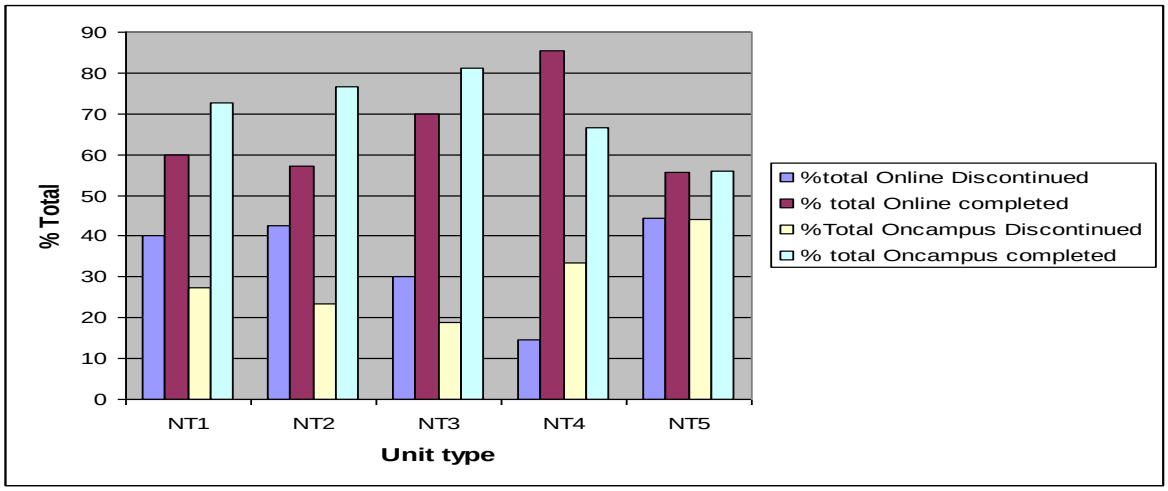


Table 7: Total completions and discontinued for Non-Technical/Theory units, 2002-2008

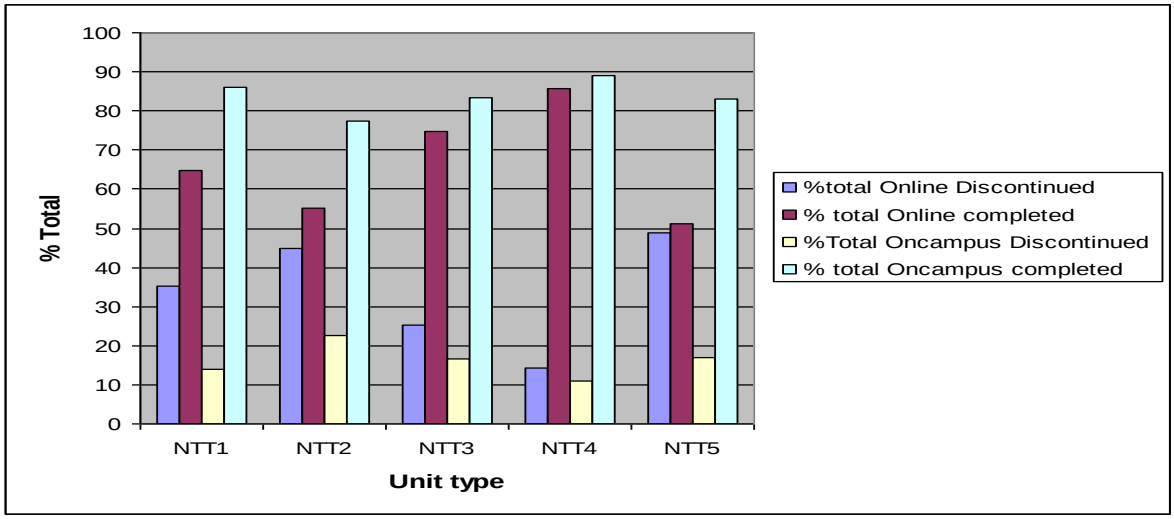
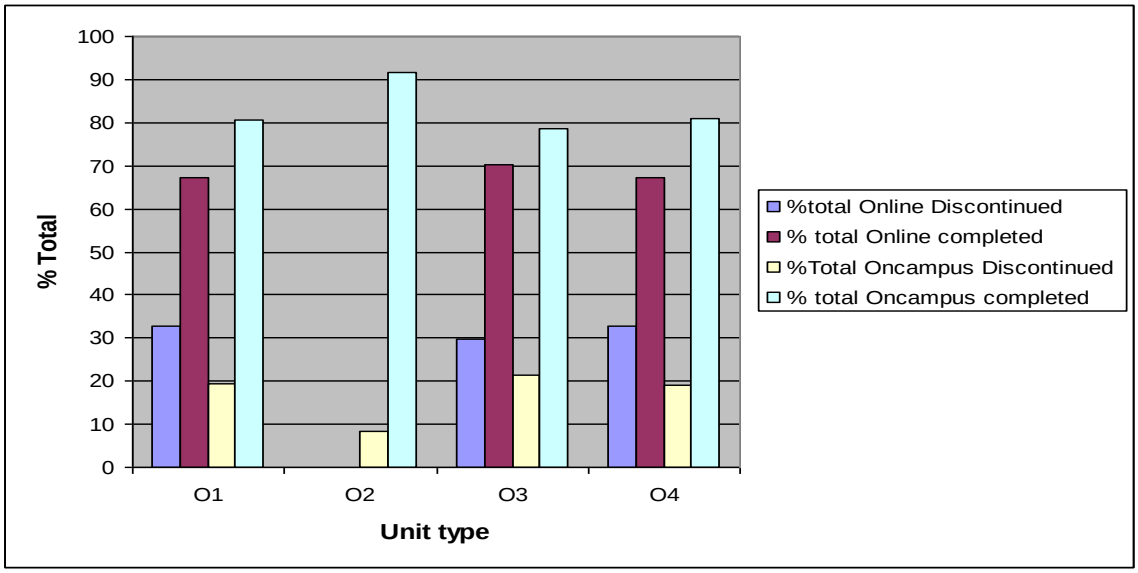


Table 8: Total completions and discontinued for Other units, 2002-2008



CONCLUSIONS

Online education has become a popular alternative to more traditional delivery modes in tertiary education, as it offers part time and working students much more flexibility. To design effective elearning programs that cater for all students, educators must find new ways of improving online education and virtual leaning. To accomplish this objective, instructors need to include a variety of formats that cater for the full range of learning styles, and which allow students to engage with the learning from a number of different perspectives and via different media. Online programs should provide opportunities for consolidation and review and the development of deep conceptual understandings, prompt feedback from the lecturer, assessments that cater for the online student and the inclusion of development environments, especially in technical subjects such as Computer Programming.

While SCIS is an ideal subject for a case study, due to the school's early initiatives in online course development, the findings in the first phase of this research project suggest that establishing an effective online learning culture is not an easy task. Even though SCIS can be considered to be an early adopter of online teaching and learning (2002), the results of this research show that most of technical and technical theory units have only been available online since 2005 and the attrition rates for online students is still high when compared to on campus students. Placing existing materials online will not necessarily meet the teaching-learning needs of students, particularly those studying wholly online. The issues of time constraints and staff professional development, attitude to change and a willingness to participate in online development and learning; may be major barriers to effective elearning program development. This certainly appears to be the case in technical subject areas such as computer programming, which are difficult to teach in the traditional classroom. Developing course materials that will overcome the barriers of virtual communication, isolation, anxiety and lack of motivation so the online student has satisfying learning experience is difficult.

This research indicates online students experience greater levels of difficulty and this is reflected in the higher discontinued rates for online versus on-campus students. Even the number of enrolments for online is much smaller in technical units, indicating that students also feel the need to participate in face-to-face learning. Even though SCIS has been developing online programs for some time, the number of the students who discontinue their course while studying technical units is still very high (more than 50 %). The research literature indicates that teaching Computer Science subjects such as

programming languages is especially challenging and it would appear that teaching in these areas in an online environment has limitations.

Creating successful learning environments at tertiary level include a complex mix of social and academic factors. Students working independently not only need to feel they belong to a wider learning community, but they also need and prefer to have the closeness and social interactivity provided in a face-to-face learning environment. This research indicates that there are other issues that need to be resolved, such as staff participation and a re-assessment of the difficulties involved in teaching and learning in the online environment.

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Enhancing Curriculum in Philippine Schools in Response to Global Community Challenges

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ABSTRACT

The world is changing so fast that in order for schools and universities to cope with new innovations, they should keep at pace with the tempo of societal changes and technological progress. The schools of today should participate in the educational and social revolution. Thus, the curriculum in Philippine schools today has to be geared to the rapid societal changes and the new responsibilities for the new breed of Filipinos. The three most important sectors of society that give direct input to the improvement of the curriculum are the academe (institutions), the government, and the industries (both public and private companies). Some government institutions, such as the Commission on Higher Education (CHED) and the Department of Education (DepEd), are directly involved in upgrading the curricular programs of learning institutions. They oversee and control the operations of schools, colleges and universities.

INTRODUCTION

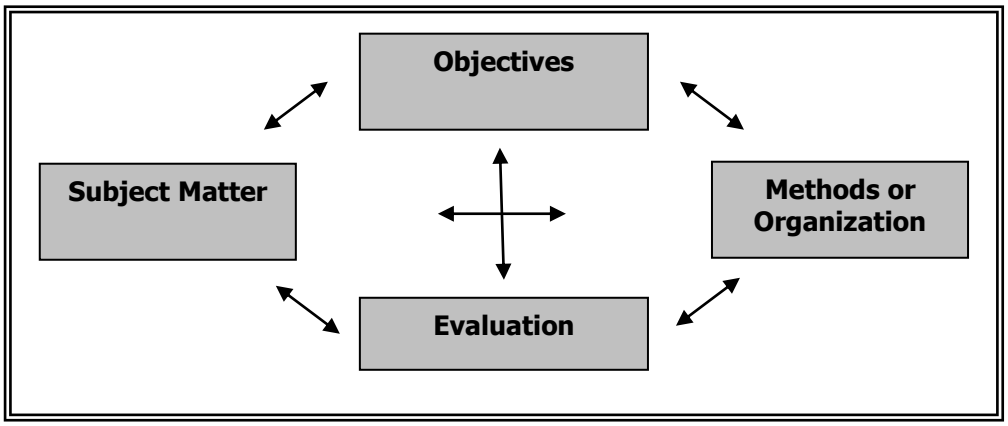
Curriculum is a broad set of experiences that students go through during the entire time they are in school. The curriculum is generally considered as the complete course path that will enable students to attain the goals and general objectives of education. It is the learner's engagement with various aspects of the environment, which is under the direction of the school. Curriculum empowers all students and motivates them towards lifelong learning. But because of technological advancements, the spread of new information media and the predominance of software and hardware devices, a school's curriculum should be enhanced. It should be pragmatic to meet the needs of society and should conform to the actualities of the community. A school's curriculum should be re-structured with a likely shift towards a more meaningful course of study.

It is indeed very important for an educational institution to have a balanced and well-designed curriculum for all the programs it offers. In doing so, the institution shall have a more stable system in undertaking its goals and mission so as to make its curricular programs efficient and effective to its major concern – the students.

Curriculum Design: Basic Concepts

"Curriculum" is from the Latin word that means "course" or "run". A school's curriculum is basically concerned with the course of study that identifies the specific goals of education for each development stage in school. Those goals are usually stated as "target competencies" a learner should achieve at a specific stage of his stay in school.

According to Monterozo (2000), curriculum design is basically concerned with the nature and arrangement of the four basic curriculum parts. These four components generally suggest to the curriculum maker four questions: What is to be included? What instructional strategies, resources and activities will be employed? What subject matter is to be included? And what methods and instruments will be used to appraise the result of the curriculum? These four components and their correlation are shown below.



Factors that Influence the Curriculum

The world is changing so fast that in order for schools and universities cope with new innovations, they should keep at pace with the tempo of societal changes and technological progress. The schools of today should participate in the educational and social revolution. Thus, the curriculum in Philippine schools today has to be geared to the rapid societal changes and the new responsibilities for the new breed of Filipinos. The three most important sectors of society that give direct input to the improvement of the curriculum are the academe (institutions), the government, and the industries (both public and private companies). Some government institutions, such as the Commission on Higher Education (CHED) and the Department of Education (DepEd), are directly involved in upgrading the curricular programs of learning institutions. They oversee and control the operations of schools, colleges and universities. Engineering programs, for instance, have been guided in the past a series of government policies, rules, and programs.

For instance, during President Ferdinand Marcos' administration, when the government shifted to parliamentary form, the Ministry of Education and Culture (MECS) issued Order No. 36 S. 1976 (the "S." stands for "Series") which spelled out "Policies and Standards for Engineering Education". About 10 years later, MECS also issued Order No. 42 S. 1985 titled "Revised Policies and Standards for Engineering Education". Upon Marcos' deposition and the consequent restoration of the presidential form of government under the Aquino Administration, the Department of Education, Culture, and Sports (DECS, which was how today's DepEd used to be called) sent out DECS Order No. 76. 1989 setting forth the "Revised Engineering Laboratory Requirements and Its Implementing Guidelines". This was supplemented in the same year by DECS Order No. 102 S. 1989 known as the "Revised Policies and Standards for Engineering Education" Later, CHED issued Order No. 16 S. 1996 which created the Technical Panel for Engineering, Architecture and Maritime Education (TPEAME).

In 1997, the Technical Panel for Engineering (TPPE) was created thru DECS Order No. 35 S. 1997 and DECS Order No. 25 and 75 S. 1998 which provided that the TPPE shall serve as a consultative, advisory and recommendatory body to the DECS. The CHED, through Memorandum Order No. 14 S. 1997, laid down "Guidelines for the Identification, Support and Development of Potential Centres of Excellence in Engineering and Architecture Programs." The issuance of guidelines was supplemented

by CHED Memorandum Order No. 49 S. 1997 which set down a new "Curriculum Guidelines for Engineering Education".

The government agency known as Department of Trade and Industry also came up in the late 90s with major programs to upgrade engineering education in the country. Two such programs were the " Industry Exposure Program for Engineering Students (IEPES) and the SMEs – Academe Collaboration for Technology Innovation (SME stands for small and medium enterprises).

Industries, on the other hand, also contribute a lot for the improvement of the curricula. Industries and companies (both public and private) give insights regarding the specific competencies and skills needed by graduates at the workplace. This is strengthened by the results of researches conducted by the Congressional Commission of Education 1993 (EDCOM) which identified the problem of mismatch between the attributes of products leaving the educational system and the expectations of industries. The mismatch was identified as having stemmed from irrelevant curricula.

Re-structuring the Curriculum

Several colleges and universities are now beginning to shape curriculum for the future in an attempt to address the realities and changes in the global community in the 21st century. They have initially envisioned the future curriculum to be:

1. Computer – Based. Subjects in the curriculum should be computer-based to meet the rapid advancement of technologies. A lot of computer software is already available in the market in almost all subjects in medicine, engineering, education, business, nursing, architecture, etc.

Current computer applications for classroom instruction vary and include:

Computer-Assisted Instruction (CAI) – uses the computer as well as a self-contained teaching machine to present individual lessons

Computer-Managed Instruction (CMI) – uses the computer to organize instructions and track student records and progress. The instruction itself need not be delivered via a computer, although CAI is often combined with CMI

Computer-Mediated Education (CME) – computer applications that facilitate the delivery of instruction and may involve electronic mail, fax, real-time computer conferencing, and World Wide Web application.

Computers indeed can be used in improving the quality of student learning and the efficiency of teaching. With the CD-ROM and projection facilities, the computer is used to supplement personal teaching methods.

2. Environment – Focused. The continuing degradation of the environment has captured the attention of concerned citizens around the globe. Integration of environmental education in selected curricular programs is very important especially for a developing country like the Philippines. Students must become "earth-friendly" and commit to environmentally sound lifestyle. They must also recognize interdependence in a "global village" and be prepared to contribute to it.

In 1992, President Fidel V. Ramos signed Executive Order No. 15 that answers the call for global action on the state of the environment. He created the Philippine Council for Sustainable Development that adopted the Philippine Agenda 21which takes a balanced and integrated approach to development issues by incorporating sustainable development principles and concepts aligned with the national priorities of the government.

One of the strategies of Philippine Agenda 21 is the promotion of environmental education, information and public awareness. This strategy reinforces P.D. 1152 or the Philippine Environment Code of 1977 that mandates the integration of environmental education into the core curriculum of all academic levels. Agenda 21 recognizes the fact that both formal and non-formal environmental ethical awareness, values and attitudes, skills and behaviour are consistent with sustainable development.

As in the case of the engineering program, during the July 1996 Philippine Association of Technical Education (PATE) convention, the technical committee together with the different Technical Panel for Engineering, Architecture and Maritime Education (TPEAME) which serves as the technical arm of the CHED unanimously agreed to include Environmental Engineering as one of the subjects in any Engineering Program to help develop in future engineers an understanding of how humans relate to natural condition and to instil in them the importance of making wise decision on the use of natural resources.

As approved, a 2- or 3– unit subject, preferably with the descriptive title "Introduction to Environmental Engineering", is offered as compulsory subjects in all Engineering programs nowadays. Among the most popular descriptive title of the course as recommended by CHED are:

- Environmental Management
- Waste Management
- Industrial Waste Control
- Waste Pollution Control, Treatment and Disposal

The topics outlined by the TPEAME include the following:

- Principles of Ecology
- Sustainability Concept
- Global Environmental Issues
- Local and International Regulations
- Environmental Impact Assessment
- Water and Waste Waster Engineering
- Air Pollution
- Solid Waste Management
- Waste Minimization
- Noise Pollution
- Thermal Pollution

3. Research – Oriented. With the complex problems teachers face, they need to find solutions and it is in finding those solutions that research plays an important role. Research enables educators to identify outcomes, make predictions and establish cause-and-effect relationships. Assigning research work to students will give them the opportunity to learn by themselves with minimal supervision from their teachers. By doing research, students will have a first-hand experience of applying the principles of scientific methodology and hence make them better decision-makers in the future. Educators are encouraged to help their students' develop research attitude (Baratang, 2003) by instilling in them the so-called "Problem-Orientedness" attitude.

The following are worthy school-based related researches (Hagos, 2007) from different universities:

- The establishment of the Central Philippines University – affiliated Non-Conventional Energy Centre (CPU-NEC) in December 1989 to introduce, transfer, and encourage the utilization of technically and economically viable non-conventional energy system that are safe, cleaner and more sustainable than the conventional fuel based system. Guimaras islands were the target

areas. This was established through the joint effort of the Electrical Engineering students of CPU and the Department of Energy.

- A study in 2000 conducted by Civil Engineering students from the College of Engineering of the Pamantasan ng Lungsod ng Manila on the production of particle boards which are not of wood origin.

- In 2000, a group of undergraduate engineering students from the College of Engineering and Technology of the University of the Philippines collaborated with the Department of Environmental and Natural Resources in conducting an "Air Pollution Study" in Norzagaray and San Jose Del Monte Bulacan where there are three cement and two lime manufacturing plants operating.

- A student from Rizal Technological University conducted a study in 2002 on the "Immobilization of Toxic Heavy Metals from Academic Wastes" such as copper, nickel, manganese, cadmium, lead and mercury by establishing a mix design between academic waste, waste, fine and coarse aggregate.

4. Technology – Enriched. The positive impact of technology is not limited to business, government and medicine but extends to education as well. The advances in communication and information technology is radically altering the shape and delivery of learning throughout the world. Technological innovations have reshaped societies and affected men's life. It is likewise revolutionizing and globalizing education to meet business and industry needs.

Realizing that technology is the most important area, which the students must master, to succeed in the 21st century, many colleges and universities have begun to install technological facilities in the campus. Computers, CD-ROMs, the Internet. e-mail, television monitors, video equipment, and satellite systems for distance learning are some of the technologies that schools have begun to use. These technological devices interconnect, enabling students to maintain continuous links with the rest of the world, to use the computers to do homework, acquire new lessons, or consult with teachers and other experts outside the campus and within the comfort of their home.

The use of these technologies makes learning more real, dynamic and more interesting. It also facilitates ease in students' comprehension and complements other available learning materials.

5. Value – Laden. Although the main focus of the curriculum is to teach students a set of body of knowledge, educators all over the world agree that values should also be integrated in the learning process. Inculcating values in an academic program can lead to the development of a human being committed to the building of a "just and humane society". All academic programs should, therefore, be strengthened with values that are worthy of perpetuation for the rebuilding of society.

Because of widespread irregularities like graft and corruption, malpractice in some profession and design activities (such as tampering designs and contracts) and degradation of moral values among college graduates, it is imperative that the academe should do something on values formation among students. Teaching the students "values" gives them better preparation for the actual practice of their profession in the future.

Some universities have integrated values-formation in their academic program. For instance, faculty members in the Mathematics department of the Institute of Arts and Sciences at Far Eastern University have emphasized the integration of the following values in their syllabus:

1. Responsibility
2. Resourcefulness
3. Creativeness

4. Patience
5. Cooperation/Teamwork
6. Neatness
7. Sportsmanship
8. Appreciation
9. Self-confidence
10. Humility

6. Community-Involved. Participation in community service has become an essential educational tool that enriches students' learning experiences. It bridges the gap between the theories learned in the classroom and the realities of life in an actual community where theories can be practiced. Mc Elhaney (1998) stated that serving the community is not only an integral part of the mission of institutions of higher education but also very much an actual tool of learning as it has been observed that there are real academic learning outcomes in individuals who participated in community service. Godwin (2001) also describes that community service is an experiential learning and has been offered as a significant strategy to assist higher education in producing the type of citizen needed for a healthy democracy.

Involving parents, teachers, members of the community and others in the process of identifying academic goals and standards and measure of programs is seen as a powerful vehicle in improving academic achievement and influencing the direction and services of the school programs. During the time of United States President Jimmy Carter, and through the help of his then Education Commissioner Ernest Boyer, the US President saw the importance of connecting the university to communities. He initiated community engagement, which called for the commitment of community schools and universities to the country's most pressing social, civic and ethical problems. (Godwin, 2001)

Another US President Bill Clinton demonstrated his belief in the educational potential of the community service by signing into a law the National Commission Service and Trust Act 1993 (Diaz, 2007). Clinton viewed college students as the nation's best resources to meet the challenge of rebuilding America through community service.

The Philippine government also acknowledges the value of community service as reflected in its Constitution. Article XIV of the Philippine Constitution states that:

"The state shall establish, maintain, and support a complete, adequate and integrated system of the education relevant to the need of the people and society."

On the other hand, because of its commitment to community, Far Eastern University was also challenged to help uplift the lives of the people in its adopted communities, and thus initiated school-community collaboration. The collaboration involved the administration, faculty members, non-teaching personnel, students as well as residents of their adopted communities.

Helping the community is incorporated in the Vision and Mission of the university:

"… Committed to the highest intellectual, moral and cultural standards, it [FEU] strives to produce principled and competent graduates".
"It nurtures a service-oriented community that seeks to contribute to the advancement of society…"

Its commitment to community service (Diaz, 2007) led FEU to organize a "Bisig Tamaraw" as the implementing arm of FEU extension program. Bisig Tamaraw has identified and classified its projects into three components: developmental projects which are long term and deals with development of the community; facilitative projects which are projects in partnership with other organizations and being done annually, and supplemental projects which refers to traditional gift-giving and is done annually.

7. Industry-Linked. Students are oriented to the world of work before they graduate. Curriculums are now designed to enhance optimum individual adjustments toward self-realization and career development. This means integrating classroom study with planned and supervised practical experience in technological, educational or cultural activities outside of the formal classroom environment usually in public or private enterprises.

The basic philosophy of the academe-industry linkage is that personal growth and professional development are best achieved by an educational method that combines classroom learning with periodic intervals of planned and supervised practical experience away from the academic community (Profeta, 2003). It integrates theories learned in the classroom with relevant work in the world of work. Hence, it is integrative and transformative since it combines theory and practice with the end in view of developing a graduate who is creative and responsible to the society in which he lives.

Gomez (2006) said that as the country moves towards the Information age, it becomes clearer that the education needs to respond to the nature and requirements of industry and business work force of today and tomorrow. The role of institution is to prepare individuals towards their functional and proactive roles in society. It is also essential for education to become active in understanding and internalizing the skills needed for the industry.

CONCLUSION

Central to the realization of an institution's goal is continuity and innovation anchored on a relevant curriculum. Change in strategies, in the course contents, in methodologies for teaching, is well recognized as sensitive, difficult and sometimes, impossible, so much so that the acceptance of the status quo is pervasive.

There is a great belief that if a plan is well planned and based on logical theories and goals; there is nothing that will prevent it from being initiated. Yet, it will also be noted that a quite a number of elaborately planned innovations and curricular changes have floundered on the threshold of the bureaucratic organization.

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Pragmatic Truths: When Ritual Meets the Reality of Community Engagement

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ABSTRACT

Community engagement is the touchstone of all universities and is critical to the credibility and overall standing of academic institutions. The cardinal features of engagement include 'Capability, Commitment, Contribution, Continuity, Collaboration and Conscience'. However these abstract concepts are often idealized and simplistic. On the other hand, when community engagement is managed well, participatory planning can produce better substantive ideas, useful relationships and stronger agreements across stakeholder groups. However, if engagement is more ritual than reality, it can lead to technically deficient ideas, frustrated expectations, power grabs in which parochial interests dominate conflicts and mistrust.

This case study describes the realignment of graduate nurse education at Edith Cowan University's School of Nursing Midwifery and Postgraduate Medicine with community stakeholders, to develop and sustain enrolment of students in the graduate program, with a focus on community engagement. In particular, the problems encountered will be identified and the "how to" and "how not to" manage engagement processes will be discussed.

Through the realignment process the pragmatic truths of community engagement emerged; namely, a conflict of agenda, unrealistic expectations of capability and ability of stakeholders, resistance to change. This occurred despite a true intent for meaningful, sustained and beneficial partnership.

The "how to" emerged through assessment and involved a reality check of the power of human agents. This led to the development of a conceptual model of community engagement which embodies a change management framework. The how 'not to' involved developing a set behaviours and descriptors as a diagnostic tool to identify hidden agendas, white elephants, and personal shortcomings.

In conclusion, the case study provides a set of practical resources for community engagement, lessons learned and strategies to overcome issues and concerns of real and perceived barriers. Further work is required to refine and test the approach in other settings.

INTRODUCTION

Traditionally the purpose of universities has been to provide education for individuals who have the measured capacity to undertake tertiary education. Educational programs have been dictated by university agendas, and by courses that are marketable to the community. Members of the community who were responsive to the university agenda, felt privileged to be offered a place at university. However, contemporary university based programs are now forced to respond to industry needs at almost a vocational level in order to ensure enrolment numbers. Industry and individuals are now empowered and proactive with regard to educational and workforce issues that affect them. First, industry is interested in addressing workforce pressures by adding skilled numbers to a diminishing skilled workforce. Second, for the individual, a university education is no longer elitist, as commonwealth funds are available to support students in disciplines listed as having 'shortages'. This is most evident in the healthcare field where the number of specialty nurses is significantly depleted (Duffield, & O'Brian-Palias, 2003).

Industry expectations have increased in regard to the amount of input to university decision making and processes. In the Australian context, it is this expectation that has led university decision makers to seek new and improved models of engaging the public in policy making processes (Sankar, 2005; Cavaye, 2004); with the rhetoric of "engagement" focussing on the achievement of outcomes that are mutually beneficial for the university and the wider community, a trend given national impetus through the work of the Australian Universities Community Engagement Alliance (Davis & Shirley, 2007).

Community engagement, as a key strategy for universities, ensures that community organisations are partners in developing programs which bring together a range of stakeholders in deliberation, implementation and adoption of university initiatives which dovetail with community and industry agendas. Cavaye (2004) asserts that the driver of community engagement may be linked to both community expectations and the political and social expectations of universities and governments. Whereby, the strategy is responsive to societal demands for relevance to community needs (Evans, 2005). Accordingly, the emphasis on community engagement in the university sector requires the development of enduring partnerships and collaborations with external organisations and the forming of these partnership are outlined in "how to" documents and readings which guide key stakeholders through the "engagement terrain", a terrain which takes a variety of forms but has as an essential element interaction where the learning and discovery functions of the academic institution are enriched and community capacity is enhanced (Holland, 2001).

This paper discusses a community engagement project undertaken between the University and an industry partner. The paper focuses on some of the constraints experienced by university stakeholders when participating in the project and describes the pragmatic truths that acted as disablers in the engagement interaction when the rituals of engagement take precedence over people in the engagement process, and offers solutions to dealing with the paralysis that occurs.

COMMUNITY ENGAGEMENT

For the purposes of this paper 'engagement' is used as a generic inclusive term to describe the broad range of interactions between people. It includes a variety of approaches, such as consultation, involvement and collaboration in decision-making and empowered action in formal partnerships. The word 'community' is also a very broad term used to define groups of people and here it is used to encompass stakeholders and interest groups defined by, geographic location, and a professional identity.

'Community engagement' is therefore viewed as a planned process with the specific purpose of working with an identified group (nursing educators in a hospital) connected by geographic location, with an identity to address issues affecting their delivery of their educational programs. The linking

of the term 'community' to 'engagement' serves to broaden the scope, shifting the focus from the individual to the collective, with the associated implications for inclusiveness to ensure consideration is given to the diversity that exists within any community. Engagement at Edith Cowan University (ECU) denotes a particular form of interaction between the University and the broader community, characterised by a two way flow of benefits. The key element in a successful engagement is mutuality. In short, there should be benefits for both parties if engagement is to be meaningful, sustained and successful (Edith Cowan University's Engaging and Serving our Communities Engagement Functional Plan 2008-2010, 2008).

Benefits for stakeholders include opportunities for a diversity of voices to be heard on issues which matter to the University and industry alike. Mutuality ensures that University and industry standards are met and there is ownership of solutions to problems or building plans for the future, so that industry shares in decision-making and has a higher level of responsibility for creating that future. In simple terms, engagement may foster a sense of belonging so that all stakeholders are comfortable with the fit of responding to educational and industry demands.

THE COMMUNITY ENGAGEMENT PROJECT

The community engagement was initiated by Senior Nursing Management and Nurse Educators in a Western Australian hospital to give recognition of prior learning (RPL) to their hospital-based education programs including, but not limited to, intensive care, renal nursing, and emergency nursing courses.

Existing hospital-based education programs have a recruitment function, in the sense that they attract nurses to the hospital to undertake training, and at the most fundamental level, lock in the nurse's labour for the duration of the program with the potential for ensuring an ongoing workforce in the longer term. Hospital based education programs for the most part serve the needs of industry; however, they may not meet the academic standards for RPL required by the University for the individual undertaking the course and over the course of the engagement it because apparent that the intent of the program was to address workforce issues rather than meet the professional career requirements and academic recognition at formal award level for individual nurses.

The University's engagement was also strategic. That is, course development is reliant upon meeting the strategic intent of the University, which requires community engagement as a precursor for all academic initiatives. Further, the University's postgraduate nursing program required an increase in student numbers in areas relating to advanced clinical nursing. Hence, the University entered the collaboration with an agenda to align hospital-based programs with an academic award principally to increase student enrolment. Surface Mutuality was acknowledged. For, by aligning the hospital based courses with the University's academic awards, the intent of the hospital to provide education to ensure a well-educated and competent workforce, in demanding and technologically specialised areas in nursing, was met; whilst the University's requirement to secure student numbers was also addressed (NN3ET, 2006).

Community Engagement Rituals

The University's Community Engagement Model provided the framework for collaboration and interaction. The Model involved the Six C's of Community Engagement (Brown & Isaacs, 1994) and stakeholders commenced the ritualised process of engagement according to the six C's of capability, commitment, contribution, conscience, collaboration and continuity.

Simpson Wood and Dawes (2003) believe that to assess capability the people not the project should provide the starting point, to ensure that the stakeholders have an understanding of, and experience in, the tasks at hand. This requires commitment, contribution and conscience. Commitment requires active participation in decision-making processes which strengthens capacity to mobilise personal

resources. This is significant because the engagement often requires a redefinition of goals and values challenging existing ideals and rituals. Contribution or effective participation requires setting boundaries that define participants' roles and responsibilities to each other, not as a matter of imposing control, but so that trust, shared understandings, and a "deep mutuality" may develop. When it occurs, each participant willingly is accountable for their problems, and accepts the responsibility to take steps to address them. In line with contribution and commitment the concept of conscience creates trust and mutual respect between stakeholders thereby strengthening the partnership of the engagement. These abilities may be developed over the duration of the project, but the project must commence with those who are able to champion it because of their expert understanding of the processes required to negotiate successful engagement, including collaborative communication which brings together the stakeholders on an equal footing to consider important issues.

If all attributes of this Model are not present 'process paralysis' may result because stakeholders do not have the personal and professional resources to understand the agendas, nor the capability to decision make or to focus on what is important (de Souza Briggs, 2007). Capable stakeholders are empowered by skill and position to take opportunities to best represent their agency's agenda, and to act as equal collaborators in the engagement process. This ensures that the continuity and sustainability of the project is achieved (Shirlow and Murtagh, 2004).

Pragmatic Truths

The underlying premise for any successful and sustainable engagement is that all stakeholders are equally committed to the engagement. The pragmatic truth, however, is that each group may have underlying tensions that are compounded by individual agendas and cultural artefacts, which despite all attempts to collaborate, may make the engagement process disheartening, conflictual and prone to failure.

Unfortunately, failures in engagement between stakeholders are often not accidental. Many engagements are limited to superficial planning, cursory input, limited discussions of the real ramifications of decisions, and poor supports to help stakeholders become informed and capable of exerting a real influence. This may occur because the collaboration begins with is an over emphasis on the rituals of the "doing' rather than on group dynamics. The 'how- to' management, tactics and process, rather than 'how to manage and work with people' takes precedence to get the project completed (de Souza Briggs, 2007; Butterworth & Fisher, 2001).

The experience of community engagement with hospital stakeholders highlighted the difficulties of not adequately knowing the people. That is, a focus on the managing of tasks to align the hospital based course to the university curriculum was initially overriding. Both stakeholders appeared to have reached consensus about the need for alignment and how the alignment would be undertaken. Communication at this point was superficial because in reality neither party truly understood what this alignment meant.

As the engagement progressed it emerged that hospital stakeholders perceived that alignment meant loss of ownership and control, identity of and identification with their program, and the belief that the University was getting 'their program' for nothing. On reflection, University stakeholders did not comprehend this attachment to 'a program' and the fears of the loss of that identity with that program which historically had been run by the hospital with the associated roles, responsibilities and employment that it engendered. In fact, University academics felt that the hospital participants should have felt fortunate that the University was collaborating with them to confer an academic award and providing academic guidance to them. However, understanding of educational curriculum and its ramifications and merit may not have been the remit of educators within the hospital employ. This lack in synergy in goal orientation precipitated a stalemate with both stakeholders feeling frustrated. Lack of agreement about the direction of the alignment of the program, tensions within and between groups, individuals working in silos, lack of openness, role ambiguity and unclear lines of

accountability resulted. Competing goals undermined the project as the lack of focus on collective performance and shared objectives saw both stakeholder groups considering individual output and not working together. University stakeholders relied on the appointed project manager, the local champion to "deal with" the personalities and problems within the hospital group, to ensure a shared purpose and to get the work done.

Traditionally local champions, who are a recognised and respected member of a stakeholder group, act as the key driving force to liaise throughout the engagement process. They represent, influence, and motivate to initiate or implement actions and liaise between the stakeholders to allow for more effective management of potential conflicts. However over reliance on a local champion, without consideration of the disparate personal agenda of group members, does not facilitate stakeholder allegiance to the project. What results due to this overreliance may be unresolved conflict, passive participation and tokenism (Butterworth & Fisher, 2001) as deep values and cultural differences are evidenced.

Culture is comprised of the assumptions, values, norms and tangible signs or artefacts of an organisation and its members (Zwann, 2006). It is a learned set of shared interpretations which affect the behaviour of stakeholder groups and therefore needs consideration prior to commencing any community engagement project because to be truly "engaged" necessitates shared interpretations of the reasons for engagement, as well as mutuality in benefits.

Inherent cultural differences became evident when mapping of the alignment processes began. Two mental models, one academic and one practical became overt. Mental models are representative of the culture. 'Academic' versus 'practical' were lines drawn in the sand and on the whiteboard. University academics failed to initially acknowledge the importance of cultural artefacts, which established the hospital identity and value system, as did the hospital fail to acknowledge that of the University. Schein (1992) asserts that members operate unconsciously with learned responses to the groups problems when a perceived threat to survival from external environment is presented. Vis a Vis the University and the hospital both represented the external environment in this case. The threat came from a lack of deep mutuality or understanding of the others values and the inability of either party to clearly articulate or acknowledge this.

Communication and a wide range of human experience including feelings, identity, and meaning-making, form the basis of a culture and as such is the vehicle by which meanings are conveyed, identity is composed and reinforced, and feelings are expressed (Victorian Government Department of Sustainability and Environment, 2005). If deep mutuality is to be achieved, all participants, in this engagement, must participate using different cultural habits and meaning systems in order to develop a new shared meaning of education programs and awards. Therefore, the management of people who are representative of a specific culture or agenda is critical, because conflict results when communication is superficial.

Conflict can occur around personalities, issues and values. The individuals as group members and the group help to determine whether this conflict will be a positive learning process or destructive and polarising for the group (Salas, Rosen & King, 2007; Tyler & Bladder, 2000). Resolving differences in values entails a much deeper analysis into how each of our value systems are created. A strong understanding of culture and communication processes is required for successful engagement plus a willingness to negotiate. Negotiation skills are a necessity for all stakeholders present at the Engagement Table as the approach required to bring about successful engagement requires the extensive ability to 'speak', to 'be heard', to 'know the bottom line' and to be 'respectful and acknowledging'.

The process for Community Engagement and the Six C's Model while providing the structure for engagement is limited by the Model's lack of support in ways to manage people, communication and culture. Particularly when that process is strongly aligned to change and the fears and confusion

which surround the acceptance of that change in the first instance, and then the potential for sustaining the change, over a period of time when dealing with stakeholders who may not be committed to the changes brought about by the engagement. Here, this meant the enrolment of students in the University award and amendments to the hospital based education program that ensured compliance to the University's requirements.

To deal effectively with change, it is important to realise that every change requires psychological adaptation or a period of transition so that time for adjusting to shared interpretations of meaning and a shared vision develops. This is difficult even when the change is wanted. Therefore, engagement 'champions' should anticipate stakeholders going through an ending of the old ways and an adjustment time in the beginning phase of planning to the new ways of the engagement process. This takes considerable energy and it is easy to run out of reserves, which can lead to unwise actions and frustration that may, in itself, thwart the engagement project. Thus, the ritual of engagement maybe fraught with obstacles for many reasons which are not covered in the Six C's, and stakeholders in the project outlined, used a number of strategies to understand the 'people dynamics' at play in this engagement to bring about successful outcomes for stakeholders.

STRATEGIES

Reflection played a major role in identifying why the project stalled. Questions relating to why we were 'stuck' on issues believed to have been settled formed the basis of debriefing after engagement meetings. As academics the need for the hospital to 'get on board' was a given. Why they would not, was the challenge! University stakeholders reviewed all engagements with hospital stakeholders and arrived at the following strategies to address the obstacles identified.

Relationships

Review of relationships uncovered the need to reconcile competing loyalties and responsibilities as it became evident that loyalties related to cultural artefacts and the need to preserve the integrity of differing value systems were affecting progress. This meant that academics had to refocus and re-evaluate their roles in the engagement so that competing stakeholder's values were not seen to be compromised. This meant a more than superficial acknowledging of competing values and a decision to provide multiple options for hospital stakeholders to consider. Providing multiple solutions, while knowing the bottom line, ensured that the University was seen to be flexible, acknowledging and open to all issues presented at the table.

Acknowledging the Cultural Dichotomy

Hospitals are large institutions that are hierarchical in structure, have strategic, operational, and managerial imperatives, and require workers to do their job. That is, values related to providing nurses who could work and do specialised tasks was the primary goal of educational programs and programs were a recruitment and retention strategy only. On the other hand proficiency in tasking and mechanistic control of student workload was not important to University academics. This cultural dichotomy prevented forward movement. The decision was made to reconsider our approach. What was important? Did we need to align as strictly as we felt? Did the hospital educators need the firm structure? Did the hospital understand academic requirements and award bestowal?

Acknowledgment of the cultural dichotomy became the focus of the next stakeholder interaction. However instead of focusing on difference we intentionally sought 'sameness' in thinking. This was to develop a growing sense of group cohesion and common spirit. This meant shifting the focus from the content of the educational program to patient outcomes, a common theme central to nursing, educational standards and the delivery of healthcare. This sharing of value, which both stakeholders held dear, provided common ground for discussion. Meetings then became productive with new ground rules established and cooperative rather than competitive relationships to the fore. Consensus

formed the basis of action however acknowledgement of conflict as a natural occurrence rather than an obstacle to progress reframed group dynamics.

Some time and attention was given to acknowledge the group's dynamics so that the group sustained its forward development and achieved its full potential. This required that everyone involved shared opinions, facts or feelings that they may have. It is through this sharing of contributions that the group was able to come to a decision that satisfied everyone. A useful strategy here required each member to rank order a list of prioritised items to achieve project outcomes. When each has completed the task individually, the group then set about making one list. Invariably the group rankings were more accurate than the individual rankings. This kept the group to task but acknowledged individual differences.

Emotional Intelligence

Emotionally intelligent behaviours may develop when there is diversity of culture and differences to agenda. When the group is able to rank alternatives and listen to the views of others, group members are provided with enough information to take the best action possible in relation to the engagement. This means that only through listening to someone who thinks differently can one begin to see something in a different way. Explaining the reason behind one's thought can help others to see its merit. Finally, when everyone is committed to a common purpose, the task is more easily accomplished. Commitment to a purpose helps one move past one's own initial thinking, and allows one to listen to a diversity of ideas and to make an emotionally intelligent response (Nazzaro & Strazzabosco, 2003).

Managing change

Diagram 1

In making an emotionally intelligent response Delahaye (1996) provide change management strategies which may assist in facilitating commitment to the engagement agenda. The Champion in allowing time to transition change acknowledges that stakeholders may lose focus as the impact of change becomes evident. Truthfulness in the gains and losses of the engagement and change must be honestly aired as stakeholders begin to accept and respond in ways that clarify expectations and establish new lines of authority. The emotionally intelligent champion expects group members to experience episodes of anger, frustration, discouragement and resentfulness; however this potential for conflict should be recognised but not allowed to stall the engagement. Manion (2007) calls this period of change the 'pit'. It takes courage to refocus to a positive vision of what things will be like when this transition is over and to develop a clear vision letting go of the past and moving forward. Champions encourage the stakeholder group to look ahead to new skills and new approaches and the new experiences that the change engenders. By doing so the champion creates excitement and curiosity about future directions and potentials. New meaning must be associated with the engagement and the group can ask of themselves 'What have I achieved? And what more can be achieved?' By using the

Six C's as the structure for engagement and acknowledging the cyclical process of reflection, engagement and changes to practice (see Diagram 1) the goals of the engagement are more likely to be achieved and these should be celebrated and all group members should be acknowledged and applauded.

CONCLUSIONS

Community engagement does not always go according to plan. One encounters blind alleys, false leads and disappointments from which experience is gained and thinking matures. However, project problems are the elephant in the room. Differences in success, across organisations, are rarely a topic for discussion. The idealized model of community engagement is a functional process that engenders a generative mechanism of actions, rather than for reasoning about actions. Consequently it does not account for individuals, their different representations of the situation and the influence of the wider social, organisational, and historical context on their individual perceptions, behaviours and actions. Clearly, this is an essential resource for managing community engagement projects. In questioning perspectives, and their intended and unintended consequences, the actions and interactions of stakeholders could be better understood.

Active management of people, in order to generate a shared commitment, has received scant attention. In this case, internal reflection and discussion aided the explication of a complex process and uncovered important features in the engagement process. The roots of difficulties were not just limited to the direct communication between stakeholders. The wider interaction of the legacy of the historical and cultural context of hospital-based 'training' programs and a synergy of individually small factors led to the collapse in the effectiveness of community engagement. This experience illuminated the need for a richer understanding of the people and the system and for reconceptualisation of community engagement to promote a shared stakeholder representation. It also points the way for the design of pragmatic community engagement resources that aid the development of clear objectives and understanding of the various roles, responsibilities and their interdependent relationships. The promotion of shared mental models, so that those functions are transparent, can provide a common framework for assessment, planning and explanation of rationale, situational awareness and discussion. In other words, the stakeholders have a shared, current, mental model of the system and process. Such resources would be of considerable value in reducing the likelihood of project paralysis by extraneous priorities and the associated emotional consequences.

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Research-based Teaching at Universities: A Case Study of KMUTT

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ABSTRACT

Traditionally, university teaching is predominantly lecture-based. An alternative approach to teaching is research-based teaching in which teachers change their roles to mentors and students change their roles to researchers. This study compares students' evaluations of the two approaches. The hypothesis of the study is that students taught with a research-based approach were likely to evaluate the teaching higher than those students taught with a lecture-based one. The subject population were students enrolled at King Mongkut's University of Technology Thonburi, which primarily focuses on science and technology. The subject samples were undergraduate students enrolled in two social studies courses, taught for three consecutive semesters. The first group (N= 1419) followed a traditional lecture-based approach and the second group (N=156) followed a research-based one. The results of the study showed that student evaluation towards the research-based approach in semester 1 and 2 of 2007 were statistically significantly higher than their counterparts. In the semester 2 of 2006, the students' evaluation towards the research-based approach was still higher than those of their counterparts, but not significantly. Then, the hypothesis of the study was accepted.

BACKGROUND OF THE STUDY

Thailand is one of many developing countries where the social structures have changed to a high degree. A society needs its population to develop their abilities. For example the population needs to comprehensively think, skilfully act, wisely analyse, properly synthesize, and prudently evaluate information. The country also needs her population to have the characteristics of enthusiasm, diligence, and voluntarism. Ultimately, the society should be concerned about the social situation at both community and world level (Chareongwongsak 1997). These changes by the Thai population will improve society. The National Education Act supports these national needs by rendering guidelines for Thai educational reform. The Act emphasizes learner-centred learning, lifelong learning, and social engagement. Section 24 of the National Education Act states that education administration has to:

'(1) provide substance and arrange activities in line with the learners' interests and aptitudes, bearing in mind individual differences;'

'(3) organize activities for learners to draw from authentic experience; drill in practical work for complete mastery; enable learners to think critically and acquire the reading habit and continuous thirst for knowledge;'

'(6) enable individuals to learn at all times and in all places. Co-operation with parents, guardians, and all parties concerned in the community shall be sought to develop jointly the learners in accord with their potentiality.'

Section 24 also suggests that learners and teachers might learn together through this course of action from any knowledge resource. It suggests instructors should try to create a learning atmosphere, provide instructional media and facilities for learners to learn and to become well-rounded people. Both students and teachers should benefit from research as part of the learning process.

However, education innovation within contemporary Thai society has not supported the Act yet. For example, Thai educational administration still supports lifelong learning through teacher-centered knowledge. Teachers always focus on studying and transferring western knowledge to their students (Sinlarat 2008). This kind of teaching is a one way communication. In this way the students learn only what the teachers want them to know, whereas they should learn how to research and to create their own personal and new interesting issues. Teaching methods of requiring knowledge better supports the principle of lifelong learning as it provides paths for them to study after school. As Brophy et al. (1998) said in their article 'lifelong learning is a deliberate progression throughout the life of an individual, where the initial acquisition of knowledge and skills is reviewed and upgraded continuously, to meet challenges set by an ever changing society.'

The direction of Thai educational reform is to teach students to be able to think, analyse, and criticize; as 'Smart Consumers'. Selecting new teaching approaches that support these characteristics must be as forward-thinking as those of other countries. The students have to create their own knowledge ('Producing Culture') instead of a 'Receiving Culture' (Silarat 2007). The appropriate teaching approach should begin with the goal of searching for new knowledge which is initiated by the teacher. Then the teacher leads the students to create a project through which they initiate a process of developing knowledge. Finally the teacher lets the students work and study together. The outcomes of this process are the students develop abilities to apply and create their knowledge (Silarat 2007).

Additionally, educational management should aim to create learners' social consciousness. For example, learning only a university's rules does not mould students' roles and morality toward society. Teaching that provides students' opportunities to develop cooperation with others, to sacrifice their own benefit for that of their colleagues, and to show responsibility in their tasks will create their social consciousness and morality better than teaching only the university's rules that are not relevant to social facts (Dewey 1909). Silarat (2007) said that the aim of general education should be based on good, practical principles. By encouraging students to learn through practice lets them have direct experiences and learn from the real world.

Another ideology, learner-centered, espoused by the Act, should be discussed in this paper. The goal of teaching and learning within the learner-centered approach is to develop learners to their optimal level. Then the teachers' roles must be decreased and learners' roles must be increased (Prapaisit 2003). Deller (1990) said that learner-centered activities were a means of countering the difficulties caused by large class size and low-tech materials. It also overcame the dissatisfaction generated by course-books that 'did not meet the real needs and interests of learners' (Tudor 1996). Collins (2004) supports the idea that self-initiated learning is the most lasting and pervasive. Learning should be 'applicable to the learners work or to other responsibilities valued by the learner.' Then, the instructor should understand the learner's needs and design appropriate learning activities in which the learner can be actively involved.

In adopting a learner-based approach, teachers have to be concerned about and be able to analyse: the potential of learners, learners' constant needs, learners' desire for topicality-new issues, learners' previous learning experience, learners' being involved in preparing and using the practice materials, the steps of learners' studying, the element of learners' surprise, learners' peer teaching and correction, and group solidarity (Tudor 1996). A study of Bosch et al (2008) studied "learning-centered" themes. The result of the study found that, to be successful in arranging teaching, the teaching must be composed of student collaboration, effective communication between teachers and students, critical thinking skills, reciprocal respect between teachers and students, passion for learning, high expectations, a variety of teaching and assessment strategies, and student engagement in and responsibility for learning. Learning opportunities outside the classroom in both intellectual and social situations are also necessary.

It is also important to consider the traditional approach, lecture-based teaching. Lectures are more likely to be popular and to be used by most teachers more than other teaching approaches as it costs

less and they are easier to be prepared. The usefulness of the lecture is that when lecturers have a lot of experience they can share profound knowledge and also spark their students' inspiration. Gardner (2004) reported in her study that the lecture was one of the highest ranked teaching approaches that best prepared the new graduate. However, the lecture was not beneficial for all age levels of learners. When it was used with older learners, it would be efficient only under certain conditions, such as: the content of the lecture was relevant to the learners' interests; the content built on their current knowledge; and the lecture was presented in a logical sequence (Knowles 1990; Tough 1979, cited from Callahan 2003). Moreover, learners were likely to lose interest when the lecture lasted more than 30 minutes or when the learners lacked relevant experience to the lecture. (Pascual et al 1998, cited from Callahan 2003).

Research by Boonhong (2002) studied the comparison between the students' satisfaction towards PBL and that towards lecture-based techniques. The report said that there were no significant differences between that towards the lecture-based technique and that towards PBL. However, the scores of satisfaction toward the latter were higher than the former.

In order to find the answer to what approach is more efficient for university students, I studied a comparison between the teaching evaluation to the lecture-based approach and that to the research-based approach. The lecture-based approach was based on the traditional teaching technique that used only the lecture as a source of knowledge for students. The lecture was one way communication. The other was the research-based approach that is based on the principles of learner-centered, lifelong learning, and social engagement which also the principles of PBL.

The aim of this article is to introduce research-based teaching in which the teachers' roles change from lecturers to research advisors and the students' roles change from receivers to researchers. Then I compared students' evaluations toward the lecture-based and the research-based approaches.

OBJECTIVE

The objective of this study is to compare the students' evaluations toward the lecture-based and the research-based approaches of studying in class. The result of the study can be helpful in arranging classes that are more efficient and that also increase students' skills, knowledge, and social morality as desired by the Thai National Education Act.

HYPOTHESIS

I hypothesized that students who were taught with a research-based approach were likely to more highly evaluate the teaching than those students who were taught with the lecture-based approach.

METHODOLOGY

Participants of the Study

The groups taught with the lecture-based technique were students who enrolled in SSC 260 - Introduction to Social Sciences, for the educational semesters starting 2/49, 1/50, and 2/50 at KMUTT. The number of students who gave their evaluation about the teaching was 1419 students enrolled in this subject with 508, 468, and 143 students in the three terms respectively. The evaluation about the teaching was confidential in order that the students would feel free to evaluate their teachers' teaching. Additionally the sexes, ages, and the year of study of the evaluators were not reported. However, the average year-levels of the students were of the first, second, and third year students according to the study plans of the students' departments.

The groups taught with the research-based technique were students who enrolled in SSC 261 - Humans and Society for the educational semesters starting 2/49, 1/50, and 2/50 at KMUTT. The

number of students who evaluated the teaching was 156 students enrolled in this subject with 38, 70, and 48 in the three terms respectively. The evaluation was also confidential. The average year-levels of the students were of the fourth year students according to the study plans of the students' departments.

Teaching Techniques in the Classroom

The lecture-based approach was used in SSC 260 - Introduction to Social Sciences for this compulsory course. This course was arranged in large classes of 200-300 students each: due to the large number of enrolling students. The course description of this subject is as follows:

Study of social phenomena, focusing on three areas of social science, i.e. cultural, political, and economic areas. This study emphasizes social problems in contemporary Thai society.

The subject course was designed to last 14 weeks. The detailed description of the course would change according to the current social situation. For example, if at that present time society was concerned with religious conflict, lectures on religion would be applied to the course. The students' final grade would be composed of class attendance (10 %), activities in class, such as report papers and homework (10 %), midterm exam (40 %), and final exam (40 %). Each class lasted for 3 hours. Absenteeism for more than 3 times would make the students fail the course. The teachers were the centre of knowledge by the process of giving lectures as shown in table 1.

Table 1 Step of learning by week of lecture-based approach

Week	Lecture topics
1	Overview lecture on the relationship between humans and society
2	Religions and societies
3	Religions in Thai society
4	Risk society
5	Social theory
6	Concept of society and culture
7	Economic forces in daily life/ part I
8	Economic forces in daily life/ part II
9	Force of capitalization, and sufficiency economy
10	Political analysis approach
11	Basic government regimes
12	Laws and societies
13	Basic concepts of demography
14	Demographic transition and society

The research-based technique was used in SSC 261 - Humans and Society, which was an elective course. The course was arranged in a medium class of 70-80 students per each class. The course was also designed to last 14 weeks. Each week the students studied the subject's content through E-learning by themselves. Additionally, they were assigned a project research according to their interests. They and the teacher had to meet to discuss their study topic every week. By the end of the course, they had to finish their research and present their study to the class. The working steps were designed as in the table below:

Table 2: Steps of learning by week of research-based approach

Week	Activities.
1	Course introduction.
2	Finding topic.

3	Discussion and suggestions on the topic.
4	Present proposal.
5-8	Discussion and suggestions on the students' works.
9-10	Data collecting.
11-12	Analyzing data and making conclusions.
13	Prepare presentation.
14	Present the result of the study in class.

Source of Data

Data used in this study came from the evaluation of courses regularly assessed by students at the end of each semester. The standard teaching evaluation form of KMUTT comprises 18 questions in three sections: 11 for teaching style, 3 for grading and evaluating, and 4 for other related issues. There are five choices for each question: most, very much, moderate, little and least. Details of this form can be found in the appendix. The university's acceptable response rate is 60%.

Study Variable

From these 18 questions, 11 were selected to construct a variable analysis that measured the evaluation of the students towards their courses. The five-multiple choice answers were scored as followed: 5 for most, 4 for very much, 3 for moderate, 2 for little and 1 for least; therefore, the aggregate totals of all 11 answers range from 11 to 55. These scores were further grouped into three segments, representing three distinct levels of satisfaction: 11-39 for the low level, 40-44 for the moderate level and 45-55 for the high level.

Statistical Analysis

Bivariate associations of each teaching approach and evaluation towards the courses were examined using the χ^2 test and test of statistically significance at 0.05. The average scores of evaluation towards the courses are also presented. Only forms with all 11 answers completed were included in the analysis; a total of 1,575 forms were used that consisted of 1,419 for the lecture-based group and 156 for the research-based group.

FINDINGS

Table 3 displays the percentage distribution of students according to their assessment towards teaching-related items and approaches. Overall, a higher proportion of students provided positive answers to all items, ranging from 'moderate' to 'most'. For the 'most' category, a higher proportion was found in the research-based group than for the lecture-based group, especially for items 4, 5, 10, 11. The bivariate associations of teaching approach and the level of evaluation scores towards the different courses can be seen in table 4. It was found that for all three semesters added together, students who were taught with the research based approach had higher proportions reporting high levels of evaluation than their counterparts on the lecture based approach, with a 0.05 statistically significant level. Moreover, semester-specific relationships were also found as there was more frequent reporting of high levels of evaluation among students who were taught with the research-based approach than their counterparts for each semester. These differences between lecture-based and research-based groups were statistically significant at the 0.05 point, except in semester 2 of 2006 (2/49).

Table 3: Level of assessment of student towards teaching related items by approaches of teaching (in %s)

Items	Least		Little		Moderate		Very much		Most		Total	
	L	R	L	R	L	R	L	R	L	R	L	R
1.	0.4	0.6	3.6	1.3	32.3	18.6	49.5	55.8	14.2	23.7	100.0	100.0
2.	0.4	0.6	4.0	0.6	33.4	19.2	47.2	48.7	14.9	30.8	100.0	100.0
3.	0.6	1.3	4.0	1.9	34.6	16.7	44.5	53.8	16.2	26.3	100.0	100.0
4.	0.6	0.6	3.6	0.6	32.0	11.5	47.8	42.3	16.0	44.9	100.0	100.0
5.	0.5	0.6	4.4	-	30.4	13.5	48.2	46.2	16.5	39.7	100.0	100.0
6.	0.5	0.6	5.3	0.6	34.5	11.5	44.3	50.6	15.4	36.5	100.0	100.0
7.	0.8	0.6	4.6	3.2	33.1	17.9	46.3	51.2	15.2	26.3	100.0	100.0
8.	0.6	0.6	3.2	0.6	32.6	10.9	47.6	50.6	15.9	37.2	100.0	100.0
9.	0.6	0.6	24	1.9	27.3	12.8	51.7	52.6	18.0	32.1	100.0	100.0
10	0.6	0.6	32	19	29.1	10.3	47.6	46.8	19.5	40.0	100.0	100.0
11.	0.5	0.6	2.3	0.6	25.2	10.3	49.3	48.7	22.8	39.7	100.0	100.0

Notes:
1 = Has a teaching approach that enables students to understand the lesson.
2 = Has a teaching approach that enables students to integrate knowledge.
3 = Explains a relationship of this subject to others.
4 = Has a teaching approach that enables students to think, analyse, and make conclusions by themselves.
5 = Gives students opportunities to ask in class.
6 = Has times for students to ask for advice outside the classroom.
7 = Applies innovation and new knowledge in their teaching.
8 = Students can apply the knowledge from this subject to real life.
9 = Proposes appropriate content for the students.
10 = Integrates morality and professional ethics in the teaching.
11 = Language and personality are appropriate.
L = Lecture-based approach, 1419 cases
R = Research-based approach, 156 cases

Table 4: Percentage of students classified by level of evaluation scores towards teaching, teaching approaches, and semesters

	Level of evaluation						χ^2	p	n
	Low		Moderate		High				
	L	R	L	R	L	R			
Semester 2/49	45.9	28.9	31.3	39.5	22.8	31.6	4.292	0.117	841
	$\bar{x}_L = 40.1$				$\bar{x}_R = 41.9$				
Semester 1/50	30.1	8.6	33.8	21.4	36.1	70.0	30.494	0.000	53
	$\bar{x}_L = 42.8$				$\bar{x}_R = 47.7$				
Semester 2/50	18.9	8.3	45.5	35.4	35.7	56.3	7.036	0.030	191
	$\bar{x}_L = 44.0$				$\bar{x}_R = 45.9$				
All semesters	38.0	13.5	33.5	30.1	28.5	56.4	59.4	0.000	157
	$\bar{x}_L = 41.4$				$\bar{x}_R = 45.7$				

Notes:

$\bar{x}_L$ = Average score of evaluation towards lecture-based approach

$\bar{x}_R$ = Average score of evaluation towards research-based approach

DISCUSSION

My hypothesis that the students who were taught with a research-based approach were likely to more highly evaluate the teaching than students who were taught with a lecture-based approach, is proven. Even though the difference found in the semester 2 of 2006 was not statistically significant at 0.05, the students' evaluation towards the research-based approach was still higher than their counterparts. It could be explained by the fact that it was the first semester that I tried this research-based approach in the classroom. Its working steps had not been well prepared yet. For example, the consistency of the meeting between teacher and students were not set; the students were too free to study by themselves; there was less teacher advice than needed; and there were still classroom lectures every week.

The result of semester 2 of 2006 was in accordance with that of Boonhong (2002), who did not report a significant difference in students' satisfaction between lecture-based teaching and that of the PBL teaching. However, both studies of Boonhong and that of my own reported that the teaching based on student-centered, lifelong learning, such as PBL or the research-based approach was evaluated higher than the lecture-based approach was.

Items 2, 4, and 7 illuminate the application of the lifelong learning process and the learner-centered principles in this research-based approach. Instead of teaching the students the teacher's knowledge, the teacher teaches them tools to study their own interesting issues to pave the way for their own study in the future. Integrating knowledge, thinking and analyzing; and applying innovation in this alternative approach developed the students' potentialities to learn by themselves throughout their lives. As already cited, Brophy et al. (1998) said that lifelong learning must happen throughout the life of a person, where one's knowledge and skills were reviewed and improved incessantly as society never stops changing.

Items 3, 8, and 10 illuminate the application of the social engagement principle in this research-based approach. The approach encouraged the students to learn social facts related to other subjects and issues. Learning the university's rules, such as wearing appropriate clothes or attending class were not enough to create students' social consciousness in behaviour and morality towards society. Group work in the research-based approach gave the students opportunities to express their desires for cooperation, self-sacrifice, and responsibility. Moreover, the approach encouraged the students to learn through field study, which was direct experience in the real world. Therefore, they would be able to engage society as they had developed their relationship to it. This result supports the study of Bosch et al (2008) who reported that successful teaching composed of various elements such as - collaboration among teachers and students, communication, critical thinking skills, reciprocal respect and students' responsibility for learning, including studying outside classroom.

Items 1, 5, 6, and 9 illuminate the application of the learner-centered principle in the research-based approach. Understanding the lessons, having opportunities to ask for advice, getting appropriate content were all shown in the students' assessment toward this approach. Accordingly, Prapaisit (2003) said that the goal of teaching and learning within the learner-centered approach was to develop learners to their optimal level. The contact between the teacher and the students generated the teaching, which met the real needs and interests of learners (Tudor 1996). Assigning the students to study their own social issues of interest supports Collins (2004) on saying that self-initiated learning was the most lasting and pervasive and should be valued by the learners. It should be mentioned that when teachers give their students each more time, they would more understand the students' needs. Then the teacher can design appropriating learning activities for their students.

Item 11 illuminates the students' opinions toward the teacher. Group study made both the teachers and the students share their experiences, whilst the lecture-based approach was inclined to stop this point (Callahan 2003). They had more time to get in touch and felt free to contact the teacher. Two-way communication happened in the process of this research-based approach. Consequently, the attitude

towards the teacher was increased, which made it easier for the teacher to teach the students better morality.

Items 4, 5, 10, and 11 each have higher scores. They also illuminate that the students were more likely to accept the research-based approach, which also positively affected the relation between the teacher and the students. Overall, the students thought that the research-based approach enabled them to produce knowledge; to think, to analyse, and to comprehend by themselves. The outcome of this approach in the long run is that the students would become 'Smart Consumers' (Sinlarat 2008) or 'Smart Citizens'.

The result of this study proved that teaching based solely on a teacher's experience that emphasized only the teacher's knowledge was no longer appropriate for contemporary Thai society. One based on innovative techniques which encourage students to explore and experience real social circumstances has more value.

SUMMARY AND SUGGESTIONS

The hypothesis of the study is proven- that students who were taught with a research-based approach were more likely to highly evaluate the teaching than were students who were taught with a lecture-based approach. A mention should be made here that this study utilized the available data of students' class evaluations with a belief that students who are satisfied with their class can learn their subject better compared to ones who are not. The results however may indicate the need to use new approaches in teaching since they are more highly evaluated than the traditional approaches are. More standardized evaluation research of teaching methods is also very necessary.

My suggestions for using innovative approaches in class are that teachers have to concern themselves about the availability of information and knowledge outside the classroom - web sites, libraries, and the mass media. They should understand that learning must not be limited only to the classroom. Learning is possible outside the classroom if appropriate planning is provided. However teachers have to contribute more time to their students in giving advice and meeting constantly with them. Students are not supposed to study alone without guidance. Moreover teachers must not only give advice but also learn alongside their students.

A flexible class arrangement should be applied to this alternative approach. However, both the teachers and the students have to be concerned about being sufficiently disciplined and motivated. Lacking a plan will result in a failure to learn.

Provision of E-learning or textbooks for self-study are necessary, as Nakavachara (2001) reported in his study that new technology significantly improved both teaching and learning. Self-study through on-line lessons with suggestions from the teachers with this research-based approach supports discussion between teacher and students. Emphasis on both documentary and field research prevents the classroom becoming boring. Moreover, weekly progress reports focuses their attention and makes them have more chance to present their own personalities to other students.

However, the university has to support new alternative approaches through both policy and budget. In addition, the small amount of students per class of the research-based approach must be of concern to the university, since it is impossible to do so with a large class of 200 students and more. The cost of a small class arrangement is worthwhile compared to the benefits of developing students' potentialities as promoted by the National Education Act. However, its cost is lower than the cost of building and providing maintenance and audio-visual apparatus for a large class. In the long-term, this approach would be worthwhile both in saving and developing the human resources of Thai society. Nevertheless, if a large class could not be avoided, active-learning (Hall et al 2002) with various techniques such as: muddiest-point-in-the-lecture cards, electronic response systems, concept tests,

peer coaching, course web pages, and web-based course evaluation must be adopted for lecture-based teaching, including some tips for giving efficient lectures to teachers. (Redish 2002)

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APPENDIX

The full questions from the university's evaluation form on instructors' teachings:

Part 1: Teaching Style

1. Presents clearly objectives and plan of study.
2. Provides documents and material.
3. Explains clearly the concept of study.
4. Has a teaching approach that enables students to understand the lesson.
5. Has a teaching approach that enables students to integrate knowledge.
6. Explains the relationship of this subject to others.
7. Has a teaching approach that enables students to think, analyse, and make conclusions by themselves.
8. The teaching covers all the contents planned in the outline.
9. Gives students opportunities to ask in class.
10. Has time for students to ask for advice outside the classroom.
11. Applies innovation and new knowledge in the teaching.

Part 2: Grading and evaluating

12. Explains clearly the assessment criteria.
13. Gives advice, reviews and reveals the question of the assignments.
14. Students can apply knowledge from this subject to real life.

Part 3: Other issues

15. Proposes appropriate content for the students.
16. Integrates morality and professional ethics in their teaching.
17. Is punctual.
18. Language and personality are appropriate.

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The Development of UCiTV (University Campus Interactive Television): UTHM Experience

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ABSTRACT

In enhancing the process of teaching and learning, many technological devices were created to facilitate these processes. As a new university in the southern of peninsular Malaysia, UTHM had introduced a new method of educational enhancement, which is the use of University Campus Interactive television (UCiTV). The changes in the development of video technology in teaching and learning process had made UCiTV a realization for this new university. The use of online video or Internet protocol television was utilized in the teaching process. Students/users are able to access and watch online video lectures in PowerPoint form. UCiTV can be accessed through campus intranet and internet, highly positive responses were given by the campus users on the whole since it can be utilized 24 hours. Viewers can also use video on demand and the concept of video streaming enable viewers to watch live telecast on any event in the university and they can be accessed continuously. These enable more interactive utilizations by the users/viewers. The quality of UCiTV depends on the content provider, networking service maintenance, infrastructure and users interests.

Keywords: Education Technology, University Campus Interactive Television (UCiTV), Streaming video, On-demand System Technology www.ucitv2.uthm.edu.my

INTRODUCTION

Technological advancement had germinated many developments in the areas of professional development, business, careers and health technology. The teaching and learning processes had also faced some drastic changes and improvement as they develop into simplified and more interesting as more information and knowledge can be assessed and gathered easily through the web. The duration of the teaching process can also be shortened as teaching materials can be downloaded from the Internet. The information and knowledge gathered would include teaching modules, lesson plans and even visual aids.

Abd Latif (2006) stated that the web utilization in the teaching process can enhance:

a. Preparation of teaching materials before and after lectures to help students in comprehension.
b. Provide students with ample opportunity to interact with the writers through e-mail.

c. Encourage students to use the internet for learning process.
d. Transmit any lectures to be assessed by students at any time and place using the internet.

University Tun Hussein Onn Malaysia had taken a drastic step in facilitating students to acquire knowledge effectively by developing a University Campus Interactive Television. This study reveals how and what are the processes involved in developing the interactive television.

TECHNIQUES IN MULTIMEDIA PRODUCTION

Multimedia production requires individuals who are an expert in their respective fields especially those who are creative and productive in designs and communications. The production of multimedia depends on the specifications of planning and development of a specific programme. This involves whether the information relayed is clear and justified to the viewer. The techniques involved in the production of a creative programme include:

- Script production
- Script content
- Format of script
- Story board production
- Video filming
- Audio production

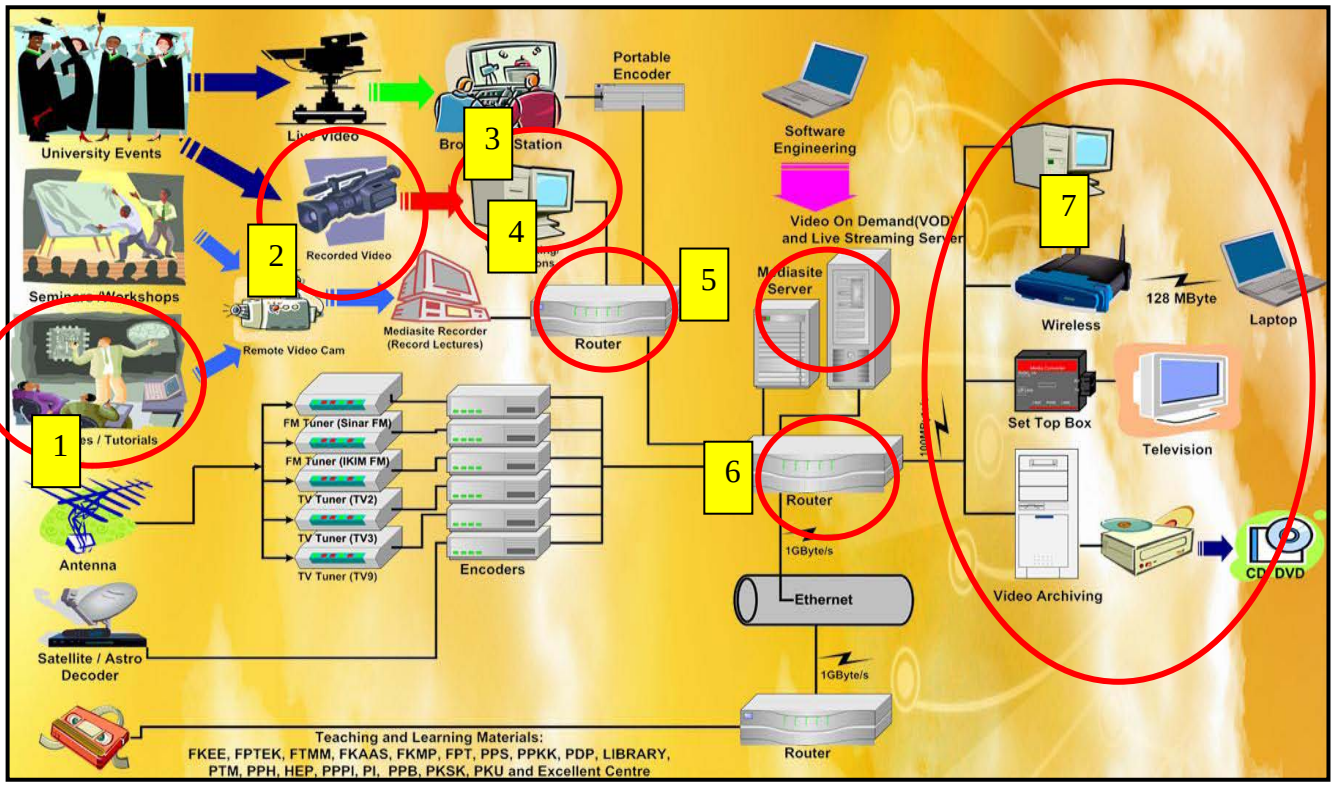

Figure 1: Work process based on tools used in the development of UCiTV

VIDEO STREAMING

Figure 1 shows the info structure of the development of UCiTV which utilizes video streaming. Oxford Dictionary (2002) defines streaming as a means of video or visual that is in motion continuously. Video Streaming means the ability to transmit live media such as audio and video from the Internet or intranet simultaneously without first downloading the file (H. Peter Alesso, 2000).

Video Streaming can be performed by using two methods which are i) live and ii) on demand. The broadcasting of football tournament, forum and meetings can also be assessed live through video streaming. The term 'on demand' concerns with the broadcasting that has been videotaped earlier and would be broadcasted only with the demand of the viewer. The video on demand would include documentary, video clips, lectures, presentations, conferences and so on.

The first animated streaming had employed the Macromedia's Shockwave and Flash protocols. This enables the animation downloading to be performed simultaneously with streaming and real-time which can be monitored interactively. (H. Peter Alesso, 2000). The process and production of streaming depend largely on the types of software chosen. The paraphernalia and software utilized in the process of multimedia production also need to be considered. Since the adaptability and comparability of the software will influence the streaming systems.

Below are the steps which are required to be measured in the process in distributing multimedia sources through streaming:

1. preparing the source.
2. shooting the audio visual using the computer and video card.
3. editing the video and save it in files which have not been compressed.
4. compressing the file.
5. distributing the source (video/audio) through the web.

These steps must be followed carefully to ensure the best outcome of the video. These steps are crucial in ensuring a quality production of the video, which can be accessed successfully. The biggest problem in effective multimedia streaming might be due to limited access broadband. Therefore, files that are going to be streamed should not be too big as this may affect the picture quality of the specific video productions.

The system will enable the users utilizing the LAN network to receive all kinds of information in the form of audio and video effectively. Internet users within the range of LAN can easily access the program. The greatest advantage is that, the process of teaching and learning can be viewed and shared by many users. Thus, teaching and lecturing is more effective as students can view the lectures repeatedly using the streaming anytime and anywhere provided that they can access the internet. As students can access the lectures repeatedly, they will have a better understanding on difficult topics without the lecturers being there.

MEDIA STREAMING CONCEPT

There are two ways in transmitting and distributing multimedia components to the users in the web, these are downloading and streaming. To enable data or files to be streamed live, the files need to be transferred into a specific format. The basic video format such as *.mpg.*avi or others need to be downloaded before the video can be played. Both downloading and streaming possess advantages and disadvantages in their own ways since it depends on the content of the media or the video utilized in the process.

Undeniably, each electronic tool may possess constraints. The main constraint in media streaming is actually the real time in to play the specific media since the efficiency of the streaming depends on the broadband and the web quality in distributing files. The focus of Windows media is to produce a system that can make and distribute the streaming content in whatever situation. It also needs to endure any limitations of the nature of website as to ensure an effective and quality production to the users (Que, 2000).

MEDIA STREAMING DELIVERY IN THE WEB

Streaming components that existed in Windows Media server will be executed through the Internet or Intranet by Windows Media Player that can be found in the user's computer. Transferring data from the server to the user requires the data to be formatted into specific forms of files, which can be read easily by router, modem, server and other elements involved in the web. Windows media server will distribute the data by streaming them into packets. These packets will be streamed by Windows Media Player and converting them into audio and visuals (Que, 2000).

The decision on how each packet is combined and distributed depends on the variety of internet protocol. Transmission Control Protocol (TCP) is used to transmit most data such as website, pictures, documents and downloaded data. On the other hand, User Datagram Protocol (UDP) is needed in delivering media through streaming as it allows Windows media components to provide security on how and when packets can be distributed effectively. (Que, 2000).

For a stream file to be transmitted and executed in an organized way, the user needs to receive all relevant data within the specific time frame in order to build audio and video frame. Bit rate of stream is the term used to determine the speed of data in producing the best media production. The main factor in limiting the distribution of streaming is the speed of broadband. The broadband determines the maximum stream bytes load in the web connection. Unfortunately, producing a quality video and audio requires a larger speed of broadband compared to the provided broadband for users. With the high demand of media streaming, more advanced technology on website, compressor and media distribution had been developed to assist a more functional media streaming.(Que, 2000). Streaming quality usually depends largely on the speed and the quality of the web between the server and the player.

SOFTWARE AND ELECTRONIC HARDWARE MANAGEMENT

The media production from an abstract idea requires different electronic hardwares in realizing the ideas. The ability to manage the variety of electronic tool in the production of quality multimedia is compulsory as it will make the message send to the user as clear and accurate. An effective multimedia production requires hardware tools such as computer and extra devices only. A person managing the multimedia production needs to be well informed and an expert who has to control two types of computer systems that are hardware and software management.

HARDWARE UTILIZATION IN DEVELOPMENTAL PROCESS

In developing the video presentation**,** Microsoft Office PowerPoint and E-learning On Demand system (EoS) must combined to produce an effective and viable presentation. These combinations will enhance the quality of the animated video production since each software will provide its best quality in the video production. E-learning On demand system technology is utilized for information sharing through on-line. It is the best internet connector that is involved in a variety of fields. E-learning On demand system will collect and capture all relevant and accurate information for distribution to the users effectively. Users or students can view and review the latest lectures or presentations through the E-learning On demand system according to their likes and interests. To its greatest advantage, the users can also record and distribute or share their presentations with other users online. In short, E-learning On demand system offers the latest technique which enhance human communication through the web and how users receive and transmit information such as career, professional development, security and education globally in no time.

E-learning On demand system offers automatic training services online, lectures and courses. It is the most suitable medium in demonstrating on how learning and working process takes place. In E-learning On demand system presentation, the presenter will give the lectures or presentation as usual and the technology will adapt the visual and audio simultaneously. As the lectures are progressing, E-

learning On demand system will stream it into the Internet. The web will consist of video and audio of the presenter interactively in the form of slides. E-learning On demand systems (OeS) is one of the soft wares that provides the best effect in providing information to the users. This software also provides an effective service anytime and anywhere, it also lessens travelling time, lessens disturbances, down time and increases the world wide web information gathering.

E-learning On demand system uses interface that contains visuals that are easy to manage where a variety of new elements can be introduced. There are three easy ways in making E-learning On demand system functions well:

- Train, discuss and teach using any video and digital devices. E-learning On demand system Recorder will record the presentation simultaneously with the notes of presentation (slides))
- Distributing recorded programme to the users according to their own specific time using the live in real time or later on demand or creating postcast voice for the listeners automatically. The users will view the presentation through E-learning On demand system Viewer as this will facilitate the users to view according to their needs at any point of the presentation. .
- Constructing catalogues, surfing and findings any customs presentations using E-learning On demand system (EoS) Server.

E-learning On demand system (EoS) also assists users to manage mobile information sources that comprises of multimedia presentations.

E-LEARNING ON DEMAND SYSTEM LIVE

By using this software, any content, information or presentation can be edited and stored directly in CD's or DVD's, USB device or stream into the internet. The interface will display the product presentation, name of presenter, time of presentation, place and the duration of the presentation. Therefore, the interface provides the appropriate information on the product to the users.

Figure 2: E-learning On demand system (EoS) Software

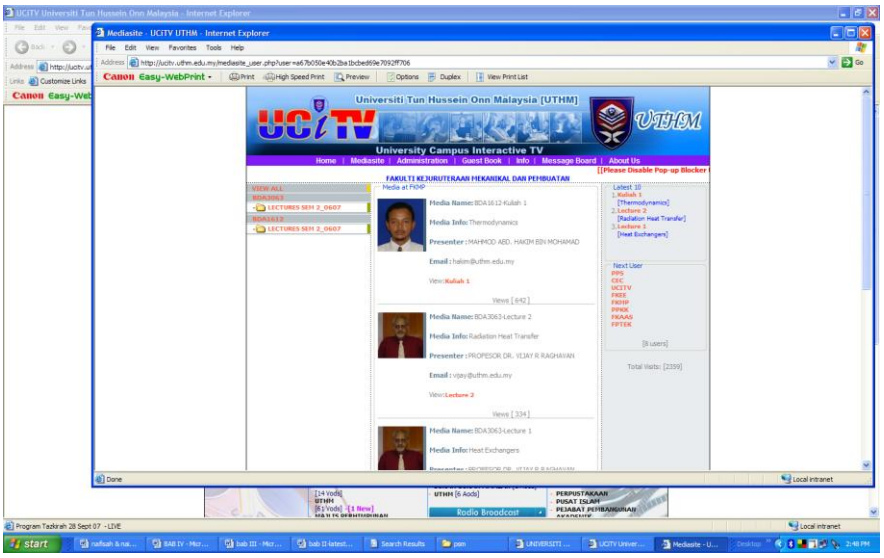

Figure 3: E-learning On demand system Interface Software

Microsoft PowerPoint seems to be presentation software that is the most popular and commonly utilized among presenters currently. By using Microsoft Power Point, the lecturer can plan and present lectures effectively and accurately. This software also enables images, clip arts and photos to be inserted by changing the slide design, slide layout or slide animation. The edited presentation can be streamed into E-learning On demand system.

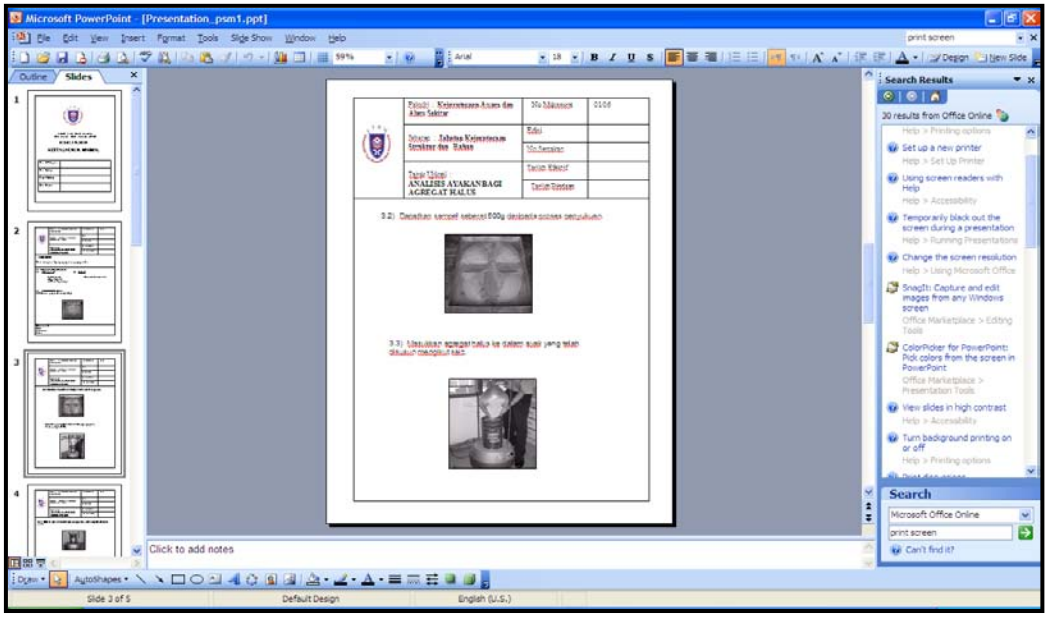

Figure 4: Power point slide in VOD presentation

TOOLS UTILIZATION IN DEVELOPMENT PROCESS

Most of the tools used in the development process of video animation for UCiTV consist of two parts, these are the preparation of slide presentation; and editing and shooting. The tools used in the development are:

Computer multimedia set

E-learning On demand system set that consists of:-

- Special computer that serves as:
  - E-learning On demand system EX Server Software
  - E-learning On demand system Recorder Software
  - E-learning On demand system Editor
- Camera and recorder.

UCITV ACHIEVEMENT

University Campus Interactive Television (intranet version) has run for about 2 years and been viewed by 600,000 viewers. The internet version which started early 2008 has been viewed from 39 countries. There are about 500 titles video on demand for this version mostly from International Seminars of various related fields like engineering, education and management. The analysis was done by using Google Analytic recently.

Lecturers, students or even the public are able to access the UCiTV web from anywhere and at anytime as long as broadband terminal is available.

CONCLUSION

1. UCiTV existence with IPTV concept can distribute information and knowledge effectively and interactively. Lectures broadcasting or university's events can be aired as live or as video on demand (VOD).
2. Broadband technology will always be upgraded to enhance the video service on line effectively.
3. The quality of video service on line depends on the content provider, service maintenance, network provider and consumer technology.

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Teaching Sustainable Stormwater Management Using Project Based Learning

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ABSTRACT

Project Based Learning (PBL) is increasingly becoming popular as a teaching aid in many universities across Australia. The theory associated with the Stormwater Management course is taught to students by solving practical problems associated with real life situations. Persistent drought has resulted in treating stormwater as a valuable resource when securing sustainable water futures for capital cities across Australia; including Melbourne. Based on feedback from potential employers of Civil and Environmental Engineering graduates the Stormwater Management course at RMIT University was reorganized to be structured around a major stormwater project to facilitate learning. The project involves arrangements to manage stormwater quantity and quality, when an undeveloped (Greenfield Area) was transformed from barren land to a fully developed urban area consisting of domestic and industry infrastructure and open space. The introduction of PBL to the course has improved the students' satisfaction rate with the course and the overall score obtained for the 'Good Teaching Scale'. The paper covers the description of the project, changes made to course content and delivery arrangements from the previous year, adopted teaching approach, students' feedback and challenges faced in delivering the course. A 66% student satisfaction rate confirmed the benefit of introducing PBL for facilitating sustainable stormwater management learning at RMIT University in Australia.

INTRODUCTION

Project Based Learning (PBL) is increasing in popularity as a teaching method in many Universities across Australia. The theory associated with the course is taught to students solving practical problems selected from real life applications. As articulated in its Teaching and Learning Strategy (2007), pedagogy at RMIT University is based on respect for student diversity to provide learning opportunities for all. It recognizes that:

- Students enter the university with a wealth of experience
- Learning and teaching is an experience between teacher and students, students and students, and students and teacher where all parties learn
- Cultural, social, gender and age differences is a positive attribute to learning
- Intellectual freedom requires nurturing

Further details of RMIT's Teaching and Learning Strategy could be obtained by visiting www.rmit.edu.au.

In PBL students generally work in teams and are more responsible for their own learning. This is a more effective way of delivering the range of graduate capabilities such as teamwork and communication, problem solving as well as technical skills required by Engineers Australia. The author reviewed a number of published research papers on Project Based Learning (PBL) related to engineering education in Australia as well as overseas. Aziz (2004) introduced PBL to counter rapid developments in very large scale integration (VLSI) technology and to expose students to life long and self motivated learning to ensure they stay up to date with technology. End program qualitative

assessment reported a high level of student satisfaction with PBL. Hadkaew et. al (2006) used a PBL model to teach students the mechanics behind blood flow in the human blood circulation system. The authors observed student interest increasing exponentially as the course progressed although some initial difficulties were faced when teaching the mathematical principles behind blood flow. Jayasuriya et. al (2007) reported the introduction of PBL to engineering education at the Victorian University and the reflective journey of two students in the first year. The authors concluded that the students embraced PBL and they performed better in the PBL subjects when compared with subjects delivered in the traditional mode. It was observed that most of the studies sighted, reported on conclusions based on observations of the researchers or qualitative data collected. Conclusions drawn from the study reported herein relied not only on observations but hard quantitative survey data collected throughout the study.

The new Civil and Infrastructure Engineering program was commenced at RMIT University in Melbourne, Australia in 2004. The program focuses on educating students on the whole lifecycle performance of infrastructure (as opposed to design and construction) and on the responsibility of the engineer with regard to sustainability of the built environment (Molyneaux and Brumley; 2007). According to above authors the following characteristics were identified by Hadgraft (2003 and 2004) as main goals when developing the new Engineering program:

- Develop the conceptual understanding required by a graduating civil and infrastructure engineer
- Develop the graduate attributes sought by Engineers Australia
- Adopt problem (and project) based learning methods to accelerate learning; and
- Engage students in the profession with the theme of sustainability when dealing with all aspects of engineering

Persistent drought has resulted in treating stormwater as a valuable resource when securing sustainable water futures for capital cities across Australia. This includes Melbourne. The Stormwater Management course at RMIT University has been offered to Civil and Environmental Engineering students since 2004. Based on feedback from potential employers of graduates, the Stormwater Management course in the new Civil and Infrastructure Engineering program was reorganized and structured around a major stormwater related project to facilitate learning in 2007. The paper covers description of the project, changes made to course content and delivery style from the previous year, adopted teaching approach, students' feedback and challenges faced in delivering the course.

REAL LIFE URBAN DRAINAGE PROBLEM

Due to urbanization and the corresponding increase in impervious area, the stormwater that previously infiltrated into the soil now flows over the hard surface increasing the surface runoff quantity. Urbanization will also increase the pollutants washed off to urban channels, creeks and the receiving waters. The Victorian Government's White Paper on water, '*Our Water Our Future'* (DSE, 2004) promotes the use of alternative sources such as stormwater for substituting potable water supply to save precious water resources. The poor quality of stormwater is the key factor limiting the use of stormwater for fit-for-purpose productive use. Receiving waters such as creeks, rivers and the Port Phillip Bay and Westernport in Melbourne, Australia are also impacted by poor stormwater quality.

Water Sensitive Urban Design (WSUD) is the integration of water cycle management into urban planning and design. Key principles of WSUD listed in Urban Stormwater-Best Practice Environmental Management Guidelines (Victorian Stormwater Committee; 1999) include: protecting natural systems; integrating stormwater treatment into the landscape; protecting water quality; reducing runoff and peak flow and adding value while minimizing development costs. As recommended in the WSUD Guidelines (WSUD; 2006), the best practice stormwater quality management objectives are to remove 80% of the suspended solid annual load; 45% of total

phosphorus annual load and 45% of total nitrogen annual load before stormwater reaches receiving waters.

The course contents were significantly revised in 2007 to reflect the current industry needs and Government Policy detailed in *Our Water Our Future*. The continuous assessment component for this course was changed in 2007 from two individual assignments to one single project directly related to the urbanization problem. The project was based on converting a parcel of Greenfield land to an urban subdivision with all modern amenities and services. The land was to be developed for medium density housing and 35% of the area was assumed to be impervious for the residential area. In developing the parcel of land, students were instructed to assume that the water from the developed land drained into an environmentally sensitive wetland/detention basin at the downstream end of the development. The class was divided into a number of teams. Each group was given a different catchment location in Australia to encourage students to think innovatively and laterally and custom build design solutions to reflect individuality.

The objectives of the project were to:

- Design an efficient and effective drainage system to carry the excess runoff caused by a storm with a given Average Recurrence Interval of 10 years
- Design a water retention basin with an appropriate outlet structure to reduce the flood peak to the pre-urbanized flood level
- Develop a stormwater quality treatment strategy to meet best practice pollutant reduction targets as detailed in WSUD guidelines

INTRODUCTION TO THE LEARNING PROGRAM

Face to face teaching consists of 2 hours per week of formal lectures and 2 hours per week of tutorial classes for students to work on the project for 12 consecutive weeks. The lecture series covered:

- Introduction to stormwater management systems
- Urban drainage design
- Stormwater routing
- Detention basin design criteria
- Stormwater quality issues
- WSUD principles and applications
- Real-life issues focused when applying WSUD principles to Green-fields and developed areas
- Pollutant reduction techniques
- Hydrologic and hydraulic modelling of stormwater systems.

In addition to the above topics, the students were taken on a field visit to show practical applications of WSUD features that had been implemented by the water industry to manage stormwater in a sustainable manner. The students were also given opportunities to interact with industry partners to discuss the challenges faced by the industry in real life when integrating the above features into Greenfield or existing developed areas. The students also had hands on working experience operating a water quality improvement software package popular with industry practitioners. Furthermore, the theory section dealing with water quality improvements was taught by an industry consultant who was able to teach designs using practical examples.

GATHERING STUDENT FEEDBACK

At end of each semester a Course Experience Survey (CES) is carried out by the RMIT University survey centre for all courses offered at the University. The survey questionnaires incorporate items from the Good Teaching Scale (GTS) of the Course Experience Questionnaire (a national graduate

survey managed by Graduate Careers Australia. As detailed on the RMIT web (www.rmit.edu.au), the CEQ questions have been designed to measure the teaching and learning effectiveness of the following themes:

- Feedback
- Quality of the Teaching and Learning environment
- Learning Objectives
- Clear Goals
- Assessment – workload
- Commitment of staff – pastoral care
- Learning Resources
- The balance of theory/instruction and practice
- Course interest
- Online – computer based materials and
- Overall Student Satisfaction.

The questionnaire consists of 21 questions (Table 1) in total. Students were required to record a score between 1 to 5 for a given statement; with a score of 1 representing 'strongly disagree', 5 representing 'strongly agree' and 3 representing a 'neutral' response towards the statement. In addition, two open ended questions investigated the students' perception on what the best aspects of the course were and what improvements did the course require.

Good Teaching Scale (GTS) measures students' perceptions of teaching standards. It focuses on teachers' feedback, motivation, attention, understanding of problems and skill in explaining concepts. High scores on this scale are associated with the perception that there are good practices in place. Conversely, lower scores reflect a perception that these practices occur less frequently. The primary purpose of the data is to contribute to a systematic improvement cycle across RMIT at the course and program level. Items making up the GTS for the Higher Education version of the CES are:

- The teaching staff in this course motivates me to do my best work. (Item 9)
- The staff put a lot of time into commenting on my work. (Item 20)
- The staff made a real effort to understand difficulties I might be having with my work. (Item 19)
- The teaching staff normally gives me helpful feedback on how I am going in this course. (Item 5)
- My lecturers were extremely good at explaining things. (Item 4)
- The teaching staff works hard to make this course interesting. (Item 17).

RESULTS AND DISCUSSION

The GTS for the Stormwater Management course in 2006, 2007 and 2008 are 30.1, 43.3 and 46.7 respectively. The final GTS score in 2007 has improved by more than 13% compared to the GTS score in 2006. It is clear from the percentage agreed values given in Table 1, the percentage values for the Item numbers that are directly related to the GTS Score have gone up by about 12%, except Item numbers 19 and 20. Figure 1 depicts the distribution of percentage of students' satisfaction for each question on the CES. The figures clearly show the results moving towards positive skewness from 2006 to 2008.

Table 1: The Course Experience Survey questions and the scores obtained in 2006, 2007 and 2008

Item No	Question	2006 (%)	2007 (%)	2008 (%)
1	The learning objectives in this course are clear to me	38	53	76
2	I am learning what I expected to in this course	48	70	85
3	This course is well organized	29	52	61

4	The teaching staff are extremely good at explaining things	38	37	50
5	The teaching staff normally give me helpful feedback on how I am going in this course	29	45	41
6	This course contribute to my confidence in tackling unfamiliar problems	19	50	62
7	Assessment tasks in this course require me to demonstrate what I am learning	60	64	88
8	The amount of work required in this course is about right	43	66	67
9	The teaching staff in this course motivate me to do my best work	17	37	48
10	I enjoy doing the work for this course	14	33	62
11	I find the learning resources for this course useful (eg. Notes, handouts, books, readings and audio-visual materials)	43	46	56
12	The web based (online) materials in this course are effective in assisting my learning	33	50	47
13	There is effective use of other computer-based teaching materials in this course	33	54	63
14	The facilities (such as classrooms, lecture theatres, studios, labs, workshops) are adequate for this course	76	73	64
15	I feel I can actively participate in my classes	52	63	73
16	There is a good balance between theory and practice	40	67	69
17	The teaching staff work hard to make this course interesting	29	59	64
18	I can see how I'll be able to use what I am learning in this course in my career	38	70	76
19	The staff make a real effort to understand difficulties I might be having with my work	38	47	45
20	The staff put a lot of time into commenting on my work	29	37	31
21	Overall, I am satisfied with the quality of this course	33	50	66

Based on a study *'The drivers behind the good teaching component of the CES'* carried out by the RMIT School of Mathematics and Geospatial Science, it was revealed that the time staff put into commenting on student work (Item 20) and feedback on student progress (Item 5) were equally the most highly related items to the good teaching factor for 2007. This indicated that they are the most influential CES items on the GTS for Civil Engineering students. Although the percentage agree on Item 5 have improved considerably from 2006, the students had not been satisfied with the comments received by staff on the work that they have been carrying out (Item 20 in Table 1). With the aid of a real life project, it was easy for students to understand the objectives of the course and to develop interest in the course. They could clearly see the applications of the theory learnt in class in solving practical problems. This is clear from the 'percentage agreed' values given in Table 1 and Figure 1. The percentage values for Item numbers 1, 9 and 17 have mostly moved from the 'neutral' position to the 'agreed position'. The questions in Item numbers 19 and 20 directly relate to the individual attention that an academic could give to students. This in turn directly relate to student numbers in the class. In spite of the Stormwater Management course being an elective course, there were approximately 50 and 80 students enrolled in the course in 2007 and 2008 respectively. This explains the reason for the slight drop in the agreed percentages from 2007 to 2008 for Item numbers 19 and 20.

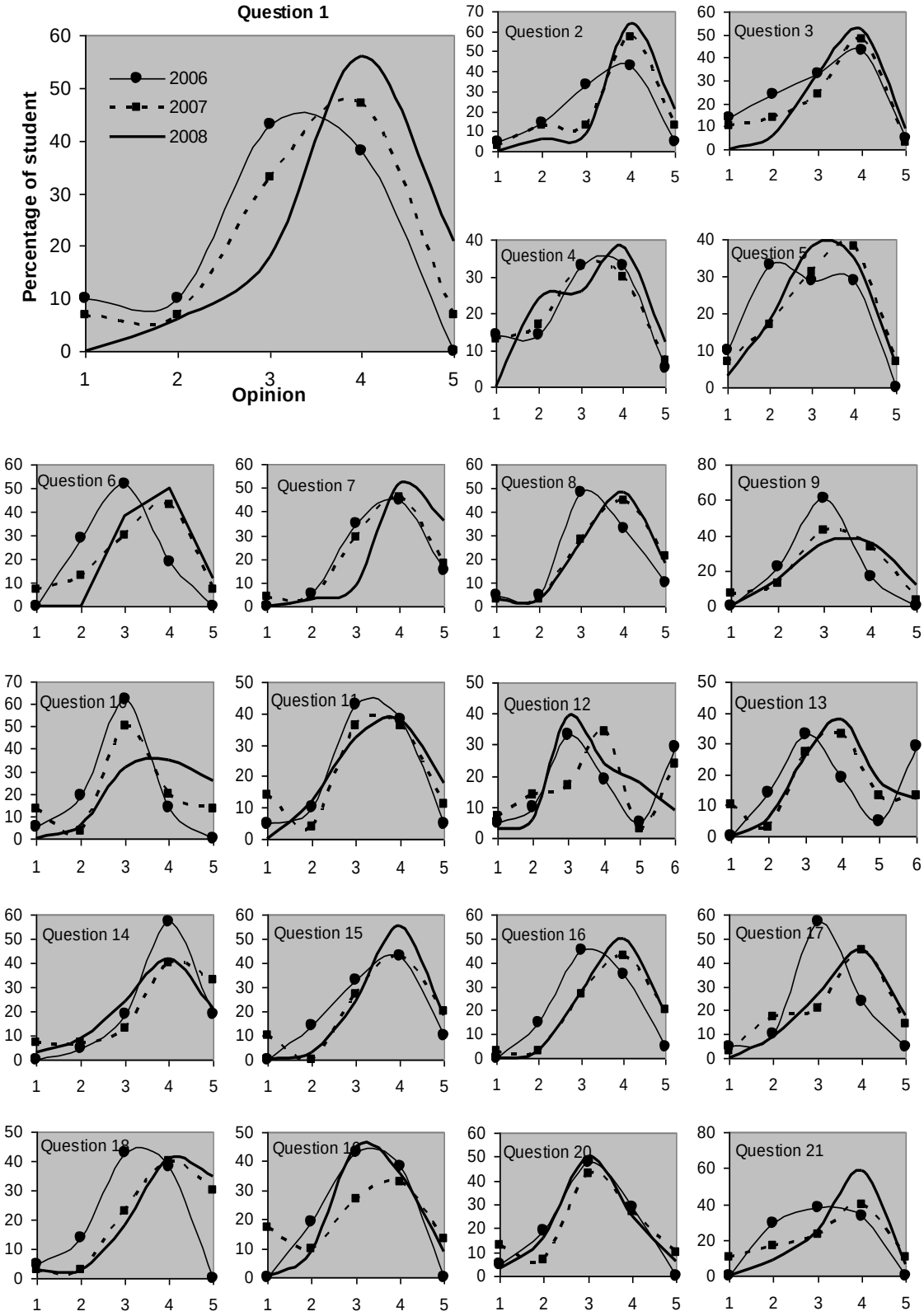

Figure 1 Course Experience Survey responses for years 2006, 2007 and 2008 (The questions are depicted in Table 1)
1= strongly disagree, 2 = disagree, 3=neutral, 4=agree, 5 strongly agree; 6 = not applicable

With the introduction of PBL, the percentage agreed scores for organization and application factors (Item Numbers 1, 2, 7 and 18) moved to being well above 75%. This was also highlighted in Section 2 of the questionnaire where they had to report on the best aspects of the course. Some of the comments given by students are reported below as being good features of the course (these are unedited quotes):

- Relating theory back to example the in real life
- Highlighting difficulties faced in industry, and what to look for
- Guest lecturers were good as their responses are based on actual industry experience
- Excursion to see structural examples performing their functions was appreciated
- Good application of theory to workplace
- The practicality of what was taught was good. I can now really see how it can be used in real life
- Assignments enabled me to put theory learnt into practice, and the result is something that I see will be useful and used in the real world
- Interesting advancements of technology in the industry and for the need for incorporating them into the course.

With the application of theory learnt in the class to the project, the students were clear on the objectives of the course. They could see how they could apply what they have learnt in theory at a later stage when they begin work as practicing as engineers. The course enjoyment (Item 10) has improved from 14% to 62% from 2006 to 2008. However, the students' responses on Environmental factors (Item 14 - facilities) have decreased from 76% to 64% from 2006 to 2008 which is again a direct reflection of the student numbers and congested lecture halls. The overall student satisfaction rate also has improved from 33% in 2006 to 60% in 2008 (Item 21). As mentioned before, the students were exposed to a popular software package used by industry named Model for Urban Stormwater Improvement Conceptualization (MUSIC; 2007) to investigate water quality improvements affected by introducing WSUD features. The results clearly show how students appreciated this as the responses for 2007 and 2008 are more skewed to the right side (agreed) when compared to the 2006 responses.

As reported in Chartier & Gibson, (2007), the above results clearly reinforced the fact that project based learning gives students' exposure to education in a manner which is both fun and motivating, whilst enforcing the knowledge gained in a variety of coursework through connection to real world applications. In addition, skills related to teamwork and constructive behaviour can be developed through project based learning. These skills are not always developed by students learning in a traditional classroom environment. Thus, project based learning offers students an effective means of developing a skill set, complementary to that learnt in the traditional coursework-style of learning.

CONCLUSIONS

Project Based Learning (PBL) was introduced in 2007 to deliver the Stormwater Management course in the School of Civil, Environmental and Chemical Engineering Programs at RMIT University. The real life problem faced by the development industry when converting urban greenfields to residential/industry development was used to teach a large class of students the theory and the application of the knowledge to solving practical problems. Significant improvements have been observed in a number of standard key performance indicators that measure the teaching and learning effectiveness of the course. Based on the above experience, Problem Based Learning has been introduced to a number of other courses such as Water Engineering and Water and Wastewater Management courses taught in the School.

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Virtual-Based Training and Creative Thinking in Higher-Level Education

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ABSTRACT

The purpose of the study reported on in this paper was to determine if Virtual-Based Training (VBT) could be used to develop students' abilities in creative thinking (CT). The sample was 26 second year undergraduate students from four different faculties at King Mongkut's University of Technology, Thonburi, Thailand selected by simple random sampling technique. Participants were divided into two groups: an experimental group consisting of 13 students (11 engineering students, and 2 architect students); a control group composed of 13 students (5 engineering students, 1 science student, and 7 industrial education and technology students). Both groups had similar background knowledge but differed in terms of their disciplines. The experimental group studied 24 CT lessons through VBT, and they had to submit their exercises by e-mail, by post, or in person. The tools used in this study were VBT in CT skills, students' assignments, a pre-test and a post-test using the Test for CT-Drawing Production (TCT-DP). Data was analysed using descriptive statistics and ANCOVA. The results of the study were as follows: (1) There was no significant difference on the pre-test scores of CT skills (TCTDP) between the experimental group and the control group. (2) There was a significant difference on the post-test scores of CT skills (TCTDP) between the experimental group and the control group. Results showed that VBT can enhance CT skills in these students in Thailand. In terms of implications, the development of VBT requires an investment of time, expertise and money. Therefore, institutions wishing to promote CT through use of such techniques will need to provide the funding and resources necessary to make possible VBT.

Keywords: Virtual-Based Training, Creative Thinking

INTRODUCTION

Definitions of creative thinking (CT) vary. Cornog (2008) defines it as the capacity to produce through thought or imagination and the capacity for original work. Kendall (1985) defines CT as a process by which something new is produced - an idea or an object including a new form or arrangement of old elements. The new creation must be useful to the solution of some problems (Harmon 1956). Creative people act differently. They face criticism with understanding. The creative

thinker has the mindset of the artist - that is, the ability to stretch his imaginative powers and see things from unusual perspectives. The meaning of CT includes components from both the cognitive and affective domains (Passi 2002). Creativity is a multi-dimensional attribute and can be both verbal and nonverbal. It includes the factors of seeing problems, fluency, flexibility, originality, inquisitiveness, and persistency.

There have been many studies of CT in face-to-face contexts but far fewer in virtual contexts. Karwowski and Soszynski (2008) studied an approach to develop creative abilities, especially creative imagination using Role Play Training in Creativity (RPTC) and the use of role playing games. Forty-seven undergraduate education students (mainly women) voluntarily participated in their study. Hsiao, Liang and Lin (2004) developed CT teaching strategies after perceiving common teaching problems for the cultivation of students' CT abilities in a computer network course. While there have been many studies of CT, few of these have studied CT in contexts of VBT at the post-secondary level and in a Thai context.

VBT is a form of e-learning that involves a formal online and offline training environment. It resembles a workshop environment but without face-to-face interaction. Trainees, trainers and co-workers use computers and software that enable them to send and receive message, interact with trainers and co-workers, read and comment on training materials, take tests, and receive feedback without having to attend scheduled workshops (Dabbagh & Bannan-Ritland 2005).

As use of computers and the Internet continues to grow, we will need to know more about how CT may occur with virtual tools. This paper attempts to fill an important gap in the research on CT as it may be practiced in virtual contexts. The objectives of the study reported on in this paper were to investigate if VBT could improve the CT skills of students at the post-secondary level in Thailand. The study was conducted with 26 second year undergraduate students from different faculties at King Mongkut's University of Technology, Thonburi, Thailand.

THEORETICAL FRAMEWORK

Sternberg and Lubart (1999) define CT as "The ability to produce work that is both novel (i.e., original, unexpected) and appropriate (i.e., useful, adaptive concerning task constraints)" (p. 3). Weisberg (1999) explains that "creative thinking by definition goes beyond knowledge" (p. 226). This argument is supported by some researchers who assert that too much knowledge may restrain creativity (Dietrich, 2004, p.10). Creativity is not simply innovation. Amabile et al. (1996) explain the difference between the two concepts by arguing that creativity represents a starting point for innovation. According to Torrance (1966) creativity is:

> A process of becoming sensitive to a problem, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypothesis about these deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results (p. 6) .

Torrance (1974) developed a test of CT which he based on four categories of responses of fluency (number of responses) flexibility of responses, originality of responses and elaboration (detail in the responses). Davis (1992) refers to four 'Ps' in relation to creativity. These are the person; product; process and press or environment/climate.

In terms of the development of thinking skills such as CT, at the age of five, our capacity for original thinking is at 90%, but by adulthood, the capacity for original thinking is only 2% (Flynn 2000). The capacities of the human brain are not fixed at birth (Deveci 2008) but actually grow and mature partly in relation to the degree to which the person exists within a stimulating physical and social environment. However, the development of CT skills is not simply a matter or developing (Klenz

1987; Marzona et al. 1988) technical skills. In fact, according to Rheingold (1984) the development of CT skills requires tolerance of ambiguity, freedom and safety as well as openness. It is intrinsic rewards and not examinations, grades or competition that are likely to produce gains in CT skills (Hennessey & Amabile 1998).

METHODOLOGY

Phase 1: The Development of the VBT Module

In the first phase the authors developed a VBT module for CT. The module relied on use of CDROM and video tapes. The trainer/instructor would be recorded in a room as shown in Figure 1. The module featured three different instructors. It consisted of 24 lessons. Each lesson had the following components: 1) aim, 2) introduction, 3) concepts, 4) operational steps, 5) examples, and 6) exercises The trainer/instructor could use a PowerPoint™ presentation and/or any other forms of teaching materials such as image, animation, textbook etc. The VBT would allow learners to obtain course-related materials online via the Internet on the university's website and offline using a CDROM.

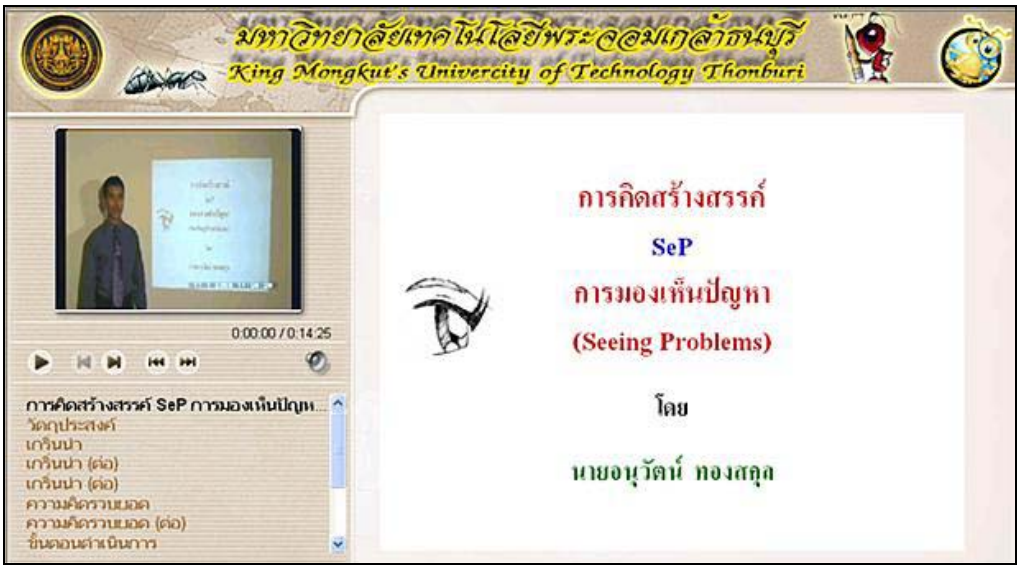

Figure 1: VBT module with trainer using a presentation

The steps involved in developing VBT were as follows:

1. Record video of trainers/instructors in the classroom and convert video to MPEG file.
2. Import the MPEG file into presentation software (e.g. Microsoft Producer for PowerPoint™.)
3. Import video, PowerPoint, sound etc. Microsoft Producer for PowerPoint™.
4. Cut video and presentation file to become synchronous.
5. Create menu for a learner to select the content that he or she would like to learn.
6. Link Microsoft Producer to PowerPoint™ with the WWW.
7. Design homepage using software such as Macromedia Dreamweaver MX.
8. Link homepage to Microsoft Producer for PowerPoint™, one file at a time.
9. Upload all files to the web if being used online.
10. For offline use, export all files; for example, flash, html, image, and others to CD.

One can develop learners' understanding for a given thinking skill in four different ways (Passi et al. 2003) through VBT. These are:

1. The structural approach (whole-part) would mean that the learners will understand a given thinking skill by breaking the 'whole into parts' i.e., breaking a concept into its attributes. Let us take the concrete example of a bicycle where the learner divides the bicycle into wheels, handle etc. In our lessons, we have done this by giving a section called the component-concepts of the skill.
2. The functional approach (uses) would mean that the learners will identify the ascribed functions, purposes and uses of a given thinking skill. For example, a bicycle can be used for movement, carrying etc.
3. The process approach can be divided into two parts: definitional description and component processes: (a) Definitional description would mean that the learner uses the art of arriving at output from the given input. For example, in the cycling process this would mean the use of a tool called cycle to cover a distance by using the principles of machines (b) In addition, the learner can also identify the component processes and their artful integration to form the complete process, e.g., the learner is busy in the process of cycling while he/she is engaged in balancing, paddling, using breaks etc.
4. Lastly, according to the operational approach (steps), learners gain awareness of the steps involved in sequential stages. For example, in the case of cycling, the operational steps would be pushing, balancing, sitting, paddling, handling, and others like using breaks. In our development of the VBT module, we have primarily used the operational approach. In our module, the steps were broken down by the teacher who explains, demonstrates, and tests the steps and stages.

The VBT module involved 24 lessons based on de Bono (2008) as follows: SeP (seeing problems), DeP (defining problems), EDI (escaping dominant idea), MaR (making rules), ReF (removing faults), EnP (enhancing persistency), APC (alternatives, possibilities, choices), C&S (consequences and sequel), CAF (consider all factors), CoC (concept challenge), COM (combination), MaD (making decisions), FOC (focusing), GoS (goal setting), IMA (imaging), OPV (other people's views), PLA (planning), PMI (plus, minus, interesting), RaI (random input), StS (stepping stone), UsA (using analogies), YNP (yes-no-po), FiR (finding requirements), ELA (elaborating).

Participants

The sample of 26 students from King Mongkut's University of Technology, Thonburi was divided into two groups as follows:

1. An experimental group: 11 engineering students and 2 architect students for a total of 13.
2. A control group: 5 engineering students, 1 science student, and 7 industrial education and technology students for a total of 13.

Instruments

We used the Test for CT-Drawing Production (TCT-DP) developed by Urban (2005) composed of 72 items with both the experimental group and the control group. The test sheets were collected after completion, lasting 15 minutes for each drawing. The test asks the testee to complete a drawing on the basis of some given figural fragments. These six figure fragments were designed with the following points in mind. They are (1) different in design, (2) geometric and non-geometric, (3) round and straight, (4) singular and compositional, (5) broken and unbroken, (6) within and outside a (seemingly) given frame, (7) placed irregularly on the space provided, and (8) incomplete.

The conceptual deliberations led to the following set of 14 key criteria that constitute as a whole the TCT-DP construct, and also serve as evaluation criteria: (1) Continuations: Any use, continuation or extension of the six given figure fragment. (2) Completion: Any addition, completions, complements, supplements made to the used, continued or extended figural fragments. (3) New elements: Any new figure, symbol or element. (4) Connections made with a line: between one figural fragment or figure

or another. (5) Connections made to produce a theme: Any figure contributing to a compositional theme or "gestalt". (6) Boundary breaking that is fragment dependent: Any use, continuation or extension of the "small open square" located outside the square frame. (7) Boundary breaking that is fragment independent. (8) Perspective: Any breaking away from two-dimensionality. (9) Humour and affectivity: Any drawing which elicits a humorous response shows affection, emotion, or strong expressive power. (10) Unconventionality: Any manipulation of the material. (11) Unconventionality: Any surrealistic, fictional and/or abstract elements or drawings. (12) Unconventionality: Any usage of symbols or signs. (13) Unconventionality: Unconventional use of given fragments, and (14) Speed: A breakdown of points, beyond a certain score-limit, according to the time spent on the drawing production.

Procedures

1. A pre-test using the TCT-DP was administered with both groups in person. There were no time limits on the pre-test. However, the more time spent, the fewer points awarded as shown in Table 1 as follows:

Time spent to complete the test	Points awarded
below 2 minutes	6
approximately 2-4 minutes	5
approximately 4-6 minutes	4
approximately 6-8 minutes	3
approximately 8-10 minutes	2
approximately 10-12 minutes	1
More than 12 minutes	0

Table 1 Time spent to complete the test and points awarded using the TCT-DP criteria

2. There are 11 criteria for scoring creativity (Jellen, H.G. & Urban, K.K. 1989) as follows: (1) Completion is for completing 6 parts of the incomplete picture outside the frame as follows: half circle, dot, right angle, curve, dotted line, and rectangle. The highest score is 6 points. (2) Addition is for adding parts of the picture so that it has meaning. The highest score is 6 points. (3) New element is for a picture or symbol independent from the specified parts of the picture. One new element is one point. The highest score is 6 points. (4) Connection made with a line is for any line which connects two elements in the picture. Each connection stands for one point. The highest score is 6 points. (5) Connection made to produce theme is for a picture or parts of the picture which show story or overall picture. Each theme is one point. The highest score is 6 points. (6) Boundary – breaking being Fragment Dependent is for any line or completion from inside towards outside the rectangular box. The score is 6 points. (7) Boundary – breaking being Fragment Independent is for any object outside the rectangular box. The score is 6 points. (8) Perspective is for any picture with 3 dimensions or depth and near-far perspective. Each perspective is one point. The highest score is 6 points. (9) Humor is for any humor by funny pictures or funny language or funny title for the picture. The highest score is 6 points. (10) Unconventionality is for any abnormal picture. (11) Speed (Sp) is time spent for completion (see more details in Table 1).
3. The experimental group of students was trained in CT skills through VBT with 24 CT lessons, for two terms during the 2007-2008 academic year. Each lesson required approximately one half hour of students' time for a total of approximately 12 hours. They completed assignments at home and delivered them to one of the three instructors either by e-mail, by post or in person. The trainers/instructors would read the exercises/assignments. There would be no right or wrong for the answers in the exercises/assignments. The purpose of the assignments was to monitor that students were doing the lessons. The control group was not trained in CT skills. Both groups attended similar regular classrooms which the university provided for the second year students.

4. At the end of the 24 lessons both groups completed a post-test using the same TCT-DP.

Data Analysis

We used analysis of co-variance (ANCOVA) to determine if the students' capabilities were different at the beginning of training. We choose to use ANCOVA because it holds constant pre-test results. This means that the scores of the pre-tests will not have any effects on the post-tests.

RESULTS

Table 1 reveals that the pre-test scores of both the experimental group ($\overline{X}$ = 41.77, *SD* = 8.10) and the control group ($\overline{X}$ = 40.85, *SD* = 6.62) were not significantly different. Thus, the ANCOVA was run. The pre-test scores (which is the main effect of the treatment) were held constant. The post-test scores of CT skills between the experimental group ($\overline{X}$ = 64.54, *SD* = 1.76) and the control group ($\overline{X}$ = 61.54, *SD* 2.50) were significant different ($p < 0.01$). This means the VBT was significant for promoting CT skills.

Tests of Between-Subjects Effects Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	62.983	2	31.492	6.708	.005
Intercept	2744.743	1	2744.743	584.645	.000
PRETEST	4.483	1	4.483	.955	.339
GROUP	56.177	1	56.177	11.966	.002
Error	107.979	23	4.695		
Total	103491.000	26			
Corrected Total	170.962	25			

a R Squared = .368 (Adjusted R Squared = .313)

Table 2: The comparison of mean scores between pre and post-tests

DISCUSSION

Our findings revealed that the experimental group showed significant improvement in CT as a result of the 24 lessons in CT delivered by VBT. It is to be expected that the CT skills of the group would improve. After all they were subject to 24 lessons or 12 hours of training in CT. It was not within the scope of this study to administer a treatment to the control group. Thus, they did not receive any lessons in CT. Our results show therefore that the lessons are effective in enhancing CT skills. What we do not know is whether there would have been a significant improvement in CT skills in the control group if they had also completed some form of CT training. What our study shows is that VBT can be used to enhance and improve CT skills. The fact that the control group did not improve their CT skills suggests that these skills will not develop on their own. They do require an intervention. They do need to be taught. Our study illustrates that they can be taught virtually using VBT.

It is difficult for us to compare our results with those of others since there has been so little research carried out on CT in online environments. Hsiao, Liang and Lin's (2004) study of a CT model in a computer course was different than ours in that it involved creating the model and subsequently assessing students' satisfaction. We did not attempt to assess their satisfaction, although this is an objective that we might aim for in a subsequent study.

We note that the advantage of our approach is that it allows us to control and "package" in a virtual environment the teaching skills. This way we were able to control the approach much more so than if we had asked different teachers to teach the lessons in a classroom. Teaching CT skills is challenging because as Bonk and Smith (1998) explain it requires the adoption of new teaching roles. The teacher must be not traditional but consultative. Being consultative means that the student has a certain freedom, learning is student-centered and knowledge is constructed by the student. Our model offered a consultative approach to learning for the students.

The next steps would be to allow a control group to complete the lessons in a non-virtual environment. By this means we might determine if the VBT is more effective than non virtual for purposes of improving CT skills. The advantage of the VBT is that it can enhance CT skills in a way that allows students to work at their own pace and in their own time. This advantage would not be available with lessons in a face-to-face environment.

CONCLUSIONS, LIMITATIONS AND IMPLICATIONS

The purpose of this research was to develop VBT and to measure its effect on CT skills. Results showed no significant different on the pre-test scores of CT skills (TCT-DP) between the experimental group and the control group; however, there was a significant difference on the post-test scores of CT skills (TCTDP) between the experimental group and the control group. These results indicate that self-study VBT is effective for developing CT skills.

This study was limited to a small group in the country of Thailand only. Results may be different with other students in other countries. Also, the students were second-year students. We do not know how well this VBT would be if we used it at another level or with students in other faculties. Another limitation is that not every institution or instructor will be able to develop VBT because they may not have the required expertise or access to technology and skills. We needed approximately three to four hours in order to create each lesson. Those wishing to create a VBT CT module will need to invest at least 100 hours for 24 lessons. Also the PowerPoint presentations required approximately three hours per lesson for a total of 75 hours. This investment of time may not be feasible for all institutions or individuals interested in using VBT for developing CT skills. However, we would argue that this investment is worthwhile since, once the module is created, it can be used almost endlessly with a variety and large number of groups.

In terms of implications for practice, VBT could be used where the development of CT is aimed for, particularly in contexts of self-study. VBT is also useful for learners to think about their new projects in both higher education and vocational education levels. In terms of policy, the development of VBT requires an investment of time, expertise and money. Therefore, institutions wishing to promote CT through use of such techniques will need to provide the funding and resources necessary to make possible VBT.

Future research might investigate whether similar results could be obtained in other contexts and, for example, with students at higher levels or in other disciplines. Future studies might also administer non-virtual CT lessons to a control group and VBT to an experimental group to determine if VBT is more effective than regular face-to-face training for the development of CT skills. The varying backgrounds of the students and the fact that they were in different years and different faculties may have affected and possibly contaminated results. We do note however that we designed differentiated lessons for the different students. For this reason, we believe it is necessary to conduct further studies using the module with groups of students who are more similar.

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Postgraduate Students and Critical Thinking: Some Validation

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ABSTRACT

Sustainability in higher education is an interesting idea because the nature of the concept changes depending on the viewpoint of the stakeholder. For an academic, a key aspect of sustainability is about facilitating life-long learning. One way to do that is to provide students with opportunities to think for themselves and to nurture that ability.

This paper describes the second stage of a research programme whose focus was critical thinking (CT) and explores how information technology (IT) Masters-level students model problems. Results from a prior study suggested that IT students appear to improve their problem-solving ability by undertaking structured CT exercises. This study provides some validation of the first study and suggests future directions for the research programme.

Critical thinking, as taught in a university setting, is often structured as a formal logic subject. While there is nothing intrinsically wrong with teaching students logic, that does not necessarily equate to critical thinking, and also raises the question of the place of lateral thinking.

The assessment of critical thinking skills is also somewhat problematic. There are several generic assessment tools available but if critical thinking is discipline-specific, then such tools may not be particularly useful. The solution used in this research is to apply a formal critical thinking assessment instrument in a pre/post treatment experiment, the treatment being the CT exercises.

This study evaluated the CT skills of Masters-level students. The participants were a class of coursework Masters students at an Australian university. Two tests were administered that targeted CT skills regarded as essential elements in a university education. The research design was a classic pre/post treatment experiment, with the treatment being the CT exercises. The results indicate that the students' problem-solving ability improved over time which suggests that the exercises were effective, thus validating (in part) the initial study.

INTRODUCTION

Sustainability in education is a challenging idea because the concept changes depending on the *Weltanschauung* of the stakeholder. Wals and Jickling (2002, p221) assert that the "education community is divided on how to respond to the emergence of education for sustainability" and further suggest that "it is not uncommon to find that scientific, political and symbolic meanings of sustainability are used interchangeably by one and the same person or group". This clearly makes debate about sustainability lively, if confusing. Wagner and Dobrowolski (cited in Wals and Jickling, 2002, p228) make a connection between sustainability and critical thinking and indicate that "sustainability requires a focus on competencies and higher thinking skills…appreciation of holistic principles…[and] requires critical reflection on one's own teaching". Clegg (2008) suggests that universities themselves need to use creativity and critical thinking in response to changing markets and world conditions. Natale (2006) also affirms the importance of critical thinking, especially in small-group situations, and suggests that critical thinking will improve organisational performance.

There are many definitions of critical thinking. Huitt (1998) reviews a range of existing definitions and proposes: "Critical thinking is the disciplined mental activity of evaluating arguments or propositions and making judgments that can guide the development of beliefs and taking action", a definition which will be used hereafter.

DETYA (2000) report that many employers want university graduates that are able to demonstrate and use 'critical thinking or problem-solving skills'. The conventional means for universities to embed critical thinking in students is by means of classes in symbolic or formal logic, but logic problems are not always the types of problem that are faced in the workplace. Students may also learn critical thinking by using other techniques other types of problem such as case based reasoning or lateral thinking exercises.

How 'critical thinking skills' might be taught to graduates is the subject of much debate. This research explores how to promote critical thinking in postgraduate students, using a single unit (subject) as the vehicle for action learning. A combination of logic problems and lateral thinking exercises are used to potentially enhance the critical thinking skills of students. The expected outcome is that students are able to demonstrate enhanced critical thinking skills. Before discussing the details of this study it is beneficial to review research on critical thinking.

CRITICAL THINKING

An AC Nielsen survey commissioned by DETYA (2000) sought to gauge employer satisfaction with graduates using a variety of methods including questionnaires, focus groups and in-depth interviews. A key finding was that 'the skills employers consider to be most important in graduates are creativity and flair, enthusiasm and the capacity for independent and critical thinking'. Further, '[critical thinking] is of great importance to employers and seems to be the skill that most sets apart successful from unsuccessful applicants; in other words, employers value this skill and can find it but it is rare'. Comparable to the DETYA study, Field (2001) examined the skill requirements of Australian workplaces, interviewed senior staff from thirteen large enterprises across a range of sectors and concluded that "all of the jobs considered in this research had a strong cognitive component, and interviewees confirmed the importance of thinking skills".

This is not a localised phenomenon. Duoc and Metzger (2007) found that of the variables which represent the graduate quality in business masters programmes in Vietnam, *critical analysis, problem-solving skills* (my italics) and overall quality of work are the most important indicators. Jacob et al. (2006) found that critical thinking skills were perceived as being important by Malaysian employers. Harvey (1993, cited in Bowden and Marton, 1998) reported on a UK study which found that employers want communication skills; problem-solving abilities; analytical skills; and team work as graduate skill sets. The combination of problem-solving abilities and analytical skills could be construed to be 'critical thinking' skills. Knoll and Wilkins (2002) also noted that US employers wanted particular core skills in graduates including the ability to interpret business problems.

Clough (2008) decries that at Georgia Tech in the USA, "applicants…often are not as proficient as they need to be at valuing or making sense of the information to which they have instant access. Too many do not have depth of understanding …and they lack skills in critical thinking". To address this issue, many universities seek to embed critical thinking as a graduate attribute in their courses.

For example, at Edith Cowan University (ECU, 2006), "graduates will be valued for their Critical appraisal skills – planning, organising, problem solving and decision making.'. Similarly, at the University of Western Australia, it was noted that "several other fundamental generic skills (e.g. thinking critically, analysing and interpreting information accurately, and solving problems collaboratively) depend on a confident command of the resources of language" (UWA, 2008).

Generally, critical thinking, if it is taught in a university, is taught as a formal or symbolic logic subject, usually by the philosophy or mathematics department. There is nothing wrong with teaching students formal logic, but logic is not the sole tool of the critical thinker. De Bono (1970) argues that 'lateral' thinking is related to insight, creativity and humour, and that lateral thinking can be taught. De Bono differentiates between lateral thinking and logic and likens logic to 'vertical' thinking where conclusions follow directly from their antecedents (as in deductive logic). De Bono classifies problems into three types: those that require more information to be solved; those that require a rearrangement of existing information to be solved; and those that are 'no problem' i.e. those problems that already have solutions. He contends that only the first type of problem can be solved with logic, the other types require lateral thinking.

Tucker (1996) speculates whether one can become a better critical thinker through practice, an idea obviously supported by de Bono (1970). This research also makes that same assumption, although it is by no means conclusively proven.

Moore (2004) reviews the generic vs. discipline-specific critical thinking argument and suggests that generalist approaches, whilst they have a place, tend to be too positivist to be of significant use in solving real-world problems. Ennis (1989, 1990) is a critical thinking generalist and suggests that "needed research includes extensive specific studies of the degree of successful application to a topic of a critical-thinking aspect developed in one or more topics, with attention to the variables that affect this degree of success".

Of the two schools of thought regarding critical thinking, McPeck (1990a, 1990b) holds the latter viewpoint and contends that having knowledge of a subject is intimately connected with being able to think critically about it. For example, 'the critical thinker, therefore, knows what and when it might be reasonable to question something. *But this requires comprehensive understanding of the kind of information that it is...*' (my italics).

Having established that employers want graduates to have critical thinking skills and that there is debate concerning the nature of critical thinking, it is constructive to examine some field research that involves undergraduates, simply because there is little research involving postgraduates (a shortcoming which this study aims to address). Phillips and Bond (2004) also note the difficulty in establishing the exact nature of critical thinking and discuss the difference between generic and discipline-embedded critical thinking. They interviewed 13 second-year management students, firstly to elaborate what they thought of 'critical reflection' and secondly, to discuss some aspects of problem-solving tasks that were set. The data were analysed using the framework of Marton and Booth (1997). This framework is remarkably similar to the taxonomy of approaches to learning used by Ramsden (2003). Although this study has a limited sample, the results suggest that simply inserting critical thinking in the curriculum is not sufficient to embed in graduates the critical thinking skills either desired or expected by employers.

There appears to be a substantial amount of literature on critical thinking in universities that examines undergraduates (van Gelder, 2001; Tapper, 2004; Phillips and Bond, 2004) but little that examines the perceptions or abilities of postgraduates. The purpose of this research, therefore, is to explore how to foster critical thinking in postgraduate students.

RESEARCH METHOD

The primary research question to be investigated is 'Does the use of critical thinking exercises improve the critical thinking abilities of postgraduate students'? A secondary question is "Is the test instrument weighted unfairly towards students with English as a first language"? These questions can be explored quantitatively by using a form of within-subjects experiment amenable to analysis by statistical method.

The main advantage of a laboratory experiment is control over both the environment and the variables being studied but its major weakness is that behaviour exhibited under controlled conditions may bear no relationship to what occurs in a real-world scenario. This is because the variables being studied are isolated from their real-world context. Nonetheless, if only a small number of variables are to be controlled and the object of interest is the quantitative relationship between those variables then a laboratory experiment may be appropriate. Field experiments are an attempt to address the shortcomings of this method by placing the 'experiment' in a real-world situation.

In this study, the participants were a class of coursework Masters students at a large Australasian university. The students were administered two Mensa-style tests that targeted critical thinking skills regarded as essential elements in a university education. To answer the first research question, the design used was a classic pre/post treatment experiment, with the treatment being the intervening structured critical thinking exercises. The secondary question was examined by combining the final results for both phases (see below) and splitting the test scores based on whether the test element involved interpretation of a mathematical problem or an English-language problem.

THE STUDY

This study, which represents the second phase of a larger research programme, evaluated the critical thinking skills of coursework Masters-level IT students. The first phase, reported in Johnstone (2006), involved both qualitative analysis of student perceptions of the efficacy of various types of problem and quantitative analysis of the critical thinking skills of a second group of students in the same unit in the following semester.

The second phase (this study) involved quantitative analysis of the critical thinking skills of another group of students in the same unit in a subsequent semester. These students were given two tests, the first test being administered prior to the students beginning the suite of critical thinking exercises and the second at the conclusion of the suite.

In both studies, participation was voluntary and anonymous and it was emphasised that the exercises were not part of the formal curriculum and would not be assessed as such. Also, in both studies more students took the second test than the first, but these data were excluded (initially) as both pre-test and post-test data elements were required for the statistical analysis.

ANALYSIS OF FINDINGS

The suite of CT exercises comprised a set of logic-based exercises and a second set of lateral thinking exercises, the latter being drawn from de Bono (1968). The logic exercises varied from classic logic problems (for example, the Man, Goat, Wolf and Cabbage problem) that could be modelled or simulated in various ways through to "thought-only" problems that could only be solved with mathematics. The students attempted the logic problems first (over the first half of semester) and then embarked on the lateral thinking problems in the second half of the semester. The students exhibited a general preference for the lateral thinking exercises, probably because they are quite tactile in nature.

Recall that the primary research question is 'Does the use of critical thinking exercises improve the critical thinking (CT) abilities of postgraduate students'? For phase two, the question can be framed in terms of statistically-testable hypotheses thus:

$H_0 : \mu_1 = \mu_2$ (i.e. the exercises make no difference to the CT abilities of postgraduate students)
$H_a : \mu_2 > \mu_1$ (i.e. the exercises improve the CT abilities of postgraduate students)

Table 1 shows that the students displayed a statistically significant increase in their critical thinking skills ($t_{crit} = 1.86$, $t = 3.11$, $p < 0.05$). Thus the null hypothesis is rejected and the alternative accepted.

This suggests that, in the absence of any other confounding factor(s), the critical thinking exercises were of direct benefit to the students.

	Pre-test	*Post-test*
Mean	2.222222222	4
Variance	1.944444444	1.5
Observations	9	9
Pearson Correlation	0.146385011	
Hypothesized Mean Difference	0	
df	8	
t Stat	-3.10811476	
P(T<=t) one-tail	0.007243377	
t Critical one-tail	1.859548033	
P(T<=t) two-tail	0.014486754	
t Critical two-tail	2.306004133	

Table 1: Paired Two Sample t-Test of Masters Students.

This is an encouraging result and acts to provide some validation of the results obtained in the first phase (Johnstone, 2006). This result may not be easily generalisable due to the small sample size (nine students). One solution is to consider the data as independent samples and assume unequal variances. This would allow the non-pair data previously excluded to be considered as part of the analysis. This second analysis was done, the result being effectively no different than the paired test ($t_{crit} = 1.75$, $t = 2.99$, $p < 0.05$), which also acts to provide some assurance that the results are valid.

A further issue that must be considered is the expected magnitude of the treatment effect, or put another way, what is the resolving power of the statistical test? Cook (1999) states that 'because of this dependence on sample size, statistically significant results cannot always be equated with meaningful results'. Therefore 'effect size' is used as a measure of the magnitude of a treatment effect. Cohen (1988) provides a simple, but commonly accepted taxonomy of effect size thus: small (effect size = .2), medium (effect size = .5) and large (effect size = .8).

Becker (2000) asserts that there is some debate about how to compute effect sizes when the two groups are dependent (as is the case in a pre-test/post-test scenario such as this research). Dunlop et al. (1996, cited in Becker) indicate that the original standard deviations should be used to compute the effect size in this scenario. Therefore, the appropriate formula for Cohen's *d* statistic for effect size is:

$d = (m_1 - m_2)/ \sigma_{pooled}$ where m_x is the relevant sample mean and $\sigma_{pooled} = \sqrt{(\sigma_1^2 + \sigma_2^2)/2}$

Applying this formula to the data in table 1, the effect size (*d*) is calculated to be 1.35, which would be considered to be a large effect in Cohen's taxonomy. Consequently, despite the small samples, the effect is significant and thus it can be concluded that the critical thinking exercises were of direct benefit to the students.

The secondary research question is 'Is the test instrument weighted unfairly towards students who have English as a first language"? The question arose from the researcher observing that, for the classes involved, approximately 80% of the students came from a non-English speaking background or from an English as a second language background. This, in itself, is not a problem, but it was also noted that the CT tests predominately contained two types of question, one type relating to mathematics and the other consisting of some manipulation of English language symbols. An example of the latter is: "Find a six letter word made up of only the following four letters G, M, N, O". This research sought to explore this issue by examining the post-test scores of both phase one and

phase two students combined (thus increasing the sample size). The scores for each student were split by the type of question in the post-test (i.e. mathematics or English).

The secondary research question can also be framed in terms of statistically-testable hypotheses thus:

$H_0 : \mu_1 = \mu_2$ (i.e. the type of test question used makes no difference to the CT scores of postgraduate students)

$H_a : \mu_1 \neq \mu_2$ (i.e. the type of test question used affects the CT scores of postgraduate students-either positively or negatively)

Table 2 shows that the students did not exhibit a statistically significant difference when their mathematics and English CT questions are compared ($t_{crit} = 2.03$, $t = 0.57$, $p > 0.05$). Thus the null hypothesis is accepted therefore the type of test question used does not affect the CT scores of postgraduate students, at least in the sample group. Again, calculating Cohens's *d* statistic gives a value of 0.19, thus if there is an effect that was not detected by the test, the sample size would need to be increased markedly to have any chance of detecting such a small effect.

	Maths score	*English score*
Mean	1.947368421	1.789473684
Variance	0.719298246	0.730994152
Observations	19	19
Hypothesized Mean Difference	0	
df	36	
t Stat	0.571500572	
P(T<=t) one-tail	0.285605777	
t Critical one-tail	1.688297694	
P(T<=t) two-tail	0.571211554	
t Critical two-tail	2.028093987	
Mean	1.947368421	1.789473684

Table 2: Two Sample t-Test of Masters Students.

CONCLUSIONS AND FURTHER WORK

The results validate earlier work and indicate that undertaking critical thinking exercises has a positive effect on the critical thinking skills of coursework Masters-level IT students. Further, there is some evidence to suggest that the type of test CT question does not matter (with respect to students English language proficiency). Future work will involve cross-correlating critical thinking exercise type preferences with student learning style and also collecting other forms of data (e.g. video records of students solving the exercises which would show the stages that students move through as they attempt to solve problems). It would also be useful to know if the increase in critical thinking skills was related to other measures of student performance such as final examination scores.

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Expanding the Ecological Consciousness of Social Work Students: Education for Sustainable Practice

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ABSTRACT

Social work has a long tradition of being explicitly concerned with the 'person-in-environment', recognising the need to take account of context when working to address disadvantage and maximise wellbeing. This concern with environment, and indeed with the concept of sustainability has, however, been focused primarily on the social rather than the ecological (Coates 2003; Besthorne & McMillen 2002). At a time when increasing attention is being paid to the importance of promoting education about, and for, sustainability in higher education (Sipos, Battisti & Grimm 2008; Wright 2002; Thomas 2004), the social work profession also needs to begin engaging in a more holistic and integrative manner with issues of sustainability and our relationship to the non-human world. This paper reports on a course offering in a social work degree program that encourages students to consider the arguments for an expanded ecological awareness and its place in social work theory and practice. Through a critical examination of the modernist foundations of the profession and an emphasis on the development of ecological literacy, the course focuses on the ways in which such an approach might manifest in practice at the community level.

Keywords: Social work; Sustainability; Education; Ecological Consciousness

INTRODUCTION

The ecological crisis confronting humanity has been increasingly well documented in recent times, with particular attention being paid to the nature and impact of anthropogenic climate change and its consequences at global, national and local levels (United Nations Environment Program 2007; Beeton, Buckley, Jones, Morgan, Reichelt & Trewin 2006). There is also clear evidence that climate change has operated as a coalescing point for public awareness around environmental issues, with greatly increased media attention and public agitation for, and acceptance of, measures to address the crisis (see, for example, O'Brien 2008). Globally, governments have gradually begun to turn their attention to developing policies which seek to address the causes and consequences of climate change and a wide range of non-government organisations continue to agitate and advocate for action in this area. It can be argued, however, that the barriers to effective, united and global action to address the ecological crisis remain stubbornly in place, with the ongoing debate around the relative contributions of developed and developing nations to a global emissions reduction plan an unfortunate example of this.

Against this background, it is clear that the concept of sustainability has gained considerable traction in both a popular and policy sense. Yet much remains to be done. The higher education sector has some clear responsibilities in this regard, both as a source of emerging knowledge and information about sustainability, as produced through research and development activities, but also in a broader educative sense in terms of the ways in which the broad goals of education are seen to integrate or ignore the demands of ecological sustainability. Addressing this issue requires paying attention to what the sector as a whole is doing, but must also involve looking in a quite specific and focused manner at the ways in which issues of ecological sustainability are, or are not, being addressed in

individual discipline areas within the sector. As a professional degree currently taught through many universities in Australia, and in many countries around the globe, the discipline of social work is an example of an area where the concerns of ecological sustainability are yet to make a significant impact on educational practice, but where the potential for the useful and effective integration of issues of sustainability into traditional curricula is high.

SOCIAL WORK'S ECOLOGICAL ORIENTATION

A concern with people's environment has been described as one of the distinguishing features of the social work profession, one which differentiates it from other approaches to human service work and which was evident in the very earliest efforts at organised welfare (Besthorn 2002; Coates 2003). While social work was distracted from this contextual emphasis in the mid 20th century by the emerging dominance of psychoanalytic models and the resulting focus on individualised approaches, a clear tradition of practice which took the environment into account continued through this time. This was strengthened by the development of general systems theory, a model for explaining the nature of organisation in the natural world. The influence of general systems theory quickly expanded beyond the field of the natural sciences and into a range of other areas, including social work (see, for example, Hearn 1969; Pincus & Minahan 1973). The fundamental emphases of systems approaches have been further modified and adapted for application in the social sciences, and in social work have been most clearly manifest in the emergence of 'ecological' and 'life' models within the profession, theoretical approaches which have re-emphasised the 'person-in-environment' perspective (Germain 1979; Germain & Gitterman 1980). It could be argued, therefore, that social work already has a clear, theoretical link to the central concepts of ecology and that a recognition of the connections between the natural world and individuals' wellbeing is built into the profession's theoretical foundations.

However, in seeking to adapt and modify the fundamentals of systems thought to better suit the social concerns of the profession, an unfortunate narrowing of perspective has occurred. The result of this is that the profession lays claim to an ecological perspective, and a concern with the relationship between people and their environment, but this conception of ecology and environment relates almost exclusively to 'social' ecology and the 'social' environment. In other words, as ecological theories have been developed within social work, the non-human world has, to a large extent, been excluded and ignored.

There would undoubtedly be many in the profession who would consider this exclusion as justifiable and even commonsensical. After all, social work as a profession invariably deals with the human consequences of a wide range of serious, seemingly intractable, issues such as poverty, abuse, disadvantage and oppression in all its forms. These are clearly social in nature and practitioners are usually engaged in direct practice with people, either as individuals and families or as members of groups and communities. Yet as the reality of the environmental consequences of human activity become clearer, so to do the undeniable links between the health of the environment and the issue of human wellbeing and, indeed, survival. In this sense what is clearly, if slowly, emerging is recognition of the inextricable relationship between the concerns of ecological justice and those of social justice - the traditional focus of social work. The articulation of these links is now happening in both issues based and broader, global analyses (see, for example Guest, Douglas, Woodruff, & McMichael 1999).

THE NARROWING FOCUS OF HIGHER EDUCATION

The narrative of modern higher education represents, in many respects, a distillation of the themes of modernity, with its emphasis on reductionism, dualistic thinking and the notion of progressivism. Generally speaking, the university sector has been characterised by increasing levels of specialisation and a narrowing of focus, particularly as the goals of higher education have been conflated with the needs of industry and capital. David Orr (1992; 1999) has been a leading voice in recognising the consequences of this narrowing and specialisation for the broader goal of sustainability. Orr (2003) argues that

> *What passes for education has become highly technical and specialised, little of which is aimed at drawing out the full human stature of young people. We've become a nation of specialists and technicians, not broadly educated and discerning people.*

The consequence of such processes has been an educational disconnection between what we teach and learn in universities and what will actually be required if we are to address the ecological crisis and move towards a sustainable way of life.

In his work on developing an integrated approach to the science of sustainability, Capra (2002) reflects on the increasing specialisation and intellectual siloing of disciplines in higher education, noting that social scientists are concerned with rules of behaviour and social structures while the natural sciences have confined themselves to a consideration of the world of matter. Capra argues that this is a system, and a distinction, that cannot be sustained:

> *In the future, this strict division will no longer be possible, because the key challenge of this new century – for social scientists, natural scientists and everyone else – will be to build ecologically sustainable communities, designed in such a way that their technologies and social institutions – their material and social structures – do not interfere with nature's inherent ability to sustain life.* (2002, p. xix)

A similar analysis emerges from the work of O'Sullivan (1999; 2000; 2008), who has engaged in a far-reaching and visionary articulation of a new form of education, one which he refers to as a "transformative-ecozoic education" (1999, p. 6). O'Sullivan's vision is based on a critique of modernity which argues that while many benefits have flowed from the enlightenment project, modernism has reached the limit of its usefulness and new approaches are called for. O'Sullivan argues that contemporary educational approaches lack a comprehensive cosmology and in particular, a more clearly ecological vision. He states, for example, that while critical pedagogy has attempted to address issues of oppression and social justice, it lacks an orientation to the wider biotic community.

> *The general direction of critical perspectives is towards anthropocentrism. The criticism of anthropocentrism is by no means a reason for dismissal of the vital concerns that critical perspectives pose for contemporary education. These issues must be taken forwards and fused into wider biocentric concerns* (O'Sullivan 1999, p. 64).

As a profession with its educational processes now firmly embedded in the formal university sector, social work reflects these trends and manifests these issues of specialisation, reduction and disconnection. Fortunately, for social work as a discipline and for higher education as a whole, the growing interest in the issue of sustainability in education has begun to produce both thinking and practical initiatives that may be pointing the way forward.

SUSTAINABILITY IN HIGHER EDUCATION

Over a number of decades now there has been a steadily increasing interest in the idea of sustainability education at the university level and, indeed, in the idea of sustainable universities. Going back as far as 1972, a number of international and national statements and declarations linking sustainability and higher education have been produced, including the important Tbilisi and Talloires Declarations (Wright 2002; Bekessey, Burgman, Wright, Filho & Smith, nd). Reflections on the links between sustainability and higher education often result in an analysis of the fundamental roles of the university in society and, indeed, of the role of education in its broadest sense (Cullingford 2004; O'Sullivan 2008).

Wright (2002) identifies a number of themes that emerge from both the declarations mentioned above and the policies that have been subsequently implemented by a range of institutions. These themes

include (but are not limited to) the sustainable physical operations of universities, academic research, environmental literacy, ethical and moral responsibility, interdisciplinary curriculum and public outreach. In a practical sense, these themes represent attempts by the sector and institutions to take direct steps towards integrating issues of sustainability into both organisational and educative practice. Wolfe (2001) and Moody & Hartel (2007), for example, report on the experience of universities in the USA where environmental literacy requirements have been introduced into undergraduate courses. As these themes continue to emerge in practice, there is clear evidence that the sector as a whole, as well as many individual institutions, is moving towards a meaningful engagement with the issues of sustainability, although, as Blewitt notes, this movement often "seems to be occurring in geological rather than human time" (2004, p. 1).

In Australia, the report card on sustainability in higher education appears to show mixed results. While some institutions are clearly linking sustainability into wider organisational and curricular activities (Lang, Thomas & Wilson 2006), some analysts claim that there is little implementation of the commitments made through, for example, the signing of declarations and support of sustainability concepts (Thomas 2004). As Sherren notes "Sustainability is currently not well integrated across universities, but where the idea is being adopted, it seems to be happening in a meaningful fashion" (2006, p. 410). Clear evidence of this mixed response emerges from Holdsworth, Wyborn, Bekessey and Thomas's (2008) research on the extent to which universities are providing professional development opportunities around sustainability of academic staff, where results indicate that the commitment of universities to sustainability has not yet translated into this area in a meaningful way.

The consequence of this overall interest in and commitment to sustainability in higher education not yet being fully matched by effective action is that the critiques levelled at the traditional university structure and approach to education remain significant and important. Despite some promising and optimistic signs, issues such as disciplinary specialisation remain obstacles to the incorporation of more holistic and integrative approaches. At this stage we still seem a long way from the educational vision being articulated by Orr (2003) and O'Sullivan (1999; 2002; 2008) among others, which advocates for an approach that is profoundly holistic and integral. O'Sullivan, for example, argues that the features of such an educational approach will include an orientation to knowledge that is synthetic and holistic, that is time-developmental in nature, and that includes 'earth education', by which he means "not education about the earth, but the earth as the immediate self-educating community of those living and non-living beings that constitute the earth" (1999, p. 76).

ECOLOGICAL APPROACHES IN SOCIAL WORK EDUCATION

Despite the encouraging signs emerging from initiatives that seek to re-orient our higher education system towards education both about and for sustainability, a similar movement is difficult if not impossible to discern within the domain of social work education. As noted earlier in this paper, the academic literature within the field highlights the existence of a small but significant stream of work that seeks to link issues of ecology and sustainability with the traditional social justice concerns of the profession, but this literature remains marginal to the mainstream concerns of the profession. Indeed, a scan of the course offerings of social work programs across Australia reveals very little content concerned explicitly and directly with issues of ecology and environment, except where those concepts are used in their narrow, exclusively social, sense.

An exception to this general situation is a course which has been taught at James Cook University for the past 10 years, which, in its various iterations, has attempted to introduce social work and community welfare students to an approach that joins issues of social and ecological justice through the framework of community-based practice.

'WS3214: Development approaches to eco-social justice' is a compulsory level three subject taken by students completing the Bachelor of Social Work and Bachelor of Community Welfare degree programs at James Cook. The subject is also available as an elective choice for students studying in a

range of other degrees and is regularly taken by students from the social sciences, arts, education and psychology programs. The intended learning outcomes for the subject convey some sense of its orientation, with the objectives including students being able to:

- Locate their personal worldview within the dominant modernist paradigm and assess the implications of this worldview for their professional practice.
- Identify key global environmental issues and articulate the connections between these issues and the traditional concerns of social welfare
- Compare current social welfare theories advocating a 'person-in-environment' perspective, with an expanded ecological perspective that incorporates a consideration of the non-human world
- Describe the foundational principles of an eco-social justice approach to social welfare
- Identify the key features of community and social development approaches to social welfare practice

The content of the subject deals with a range of theoretical and practical material, from the values and beliefs of modernity, through the nature and extent of the ecological crisis and on to the nexus of ecological and social justice perspectives. Students are encouraged to explore the ways in which an expanded ecological perspective might be enacted in social welfare practice, with a particular focus on community development as a valuable and congruent practice approach. Key to the educational strategies developed in the subject is an emphasis on a critically reflective approach to linking the personal with the ecological, and the development of skills and knowledge for advocating within the profession for consideration of issues around ecology and sustainability.

To this end, the major assessment pieces in the subject are an ecological autobiography, in which students reflect on their personal experience through the lens of ecology, and a paper prepared for submission to an academic journal in which the students must mount an argument for the incorporation of an expanded ecological perspective into social work theory and practice. Taken together, these assessment pieces, along with the course content and pedagogical approach, aim to encourage students to expand their understanding of issues of ecology and sustainability beyond the narrow social constraints currently imposed by the profession. The subject therefore attempts to address both affective and cognitive learning, as important dimensions in education for sustainability. In this way it reflects the concerns of Shepard (2008) who argues that

> *Affective learning relates to values, attitudes and behaviours and involves the learner emotionally. Cognitive learning relates more to knowledge and its application. It is possible to construct an argument that the essence of education for sustainability is a quest for affective outcomes. (p. 88)*

The affective component of this process is seen as particularly important within a social work education setting, given that the profession has a foundation that rests on a particular set of values, and that the consideration and articulation of values and ethics is a core component of all social work courses. McMillan, Wright and Beazley's (2004) work is an example of research demonstrating that exposure to environmental content in undergraduate studies can have an affective impact, leading students to develop deeper environmental values and become more ecocentric in their worldviews. This value shift allows new opportunities for practice to be identified and explored. Two recent examples communicated to the author involve graduates who have developed ecologically oriented practice in their work with youth and new migrants respectively. These initiatives address traditional social justice concerns, but do so in a manner which recognises the interdependence of social and environmental wellbeing, using environmental activities as a method for creating social capital amongst disadvantaged groups.

In this way, the course crosses the boundaries of the traditionally defined discipline and allows students to make connections with other fields of study and, importantly, to explore the role that their own professional discipline might play in responding to, and addressing, the causes of the ecological crisis.

CONCLUSION

Set against the slow, but optimistic progress occurring within the higher education sector, both organisationally and educationally, the debates around education about, and for, sustainability do not appear to have made much of an impact within the discipline of social work to date. Despite a theoretical background that expresses concern for principles of ecology and that recognises the significance of environment for human wellbeing, the restricted definition of these concepts within the discipline means that social work education has paid little attention to issues of sustainability except in their purely social aspects. If higher education is to fulfil the important role in education for sustainability that is now being recognised throughout the sector, individual disciplines must also strive to recognise the ways in which issues of sustainability relate to their fields and to develop educational approaches that reflect this understanding. Inevitably this will mean reversing some of the trends towards greater specialisation and narrowing of focus that have become evident over time. For social work education, this will involve working towards creating opportunities for students to develop an expanded ecological consciousness, one that sees their profession as an important part of a broader movement towards sustainability.

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Student Motivation and Attitude Towards Virtual Versus Traditional Learning Based On Cognitive Styles

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ABSTRACT

The purpose of this study was to identify differences in student motivation and attitude in relation to cognitive styles between two types of instruction (virtual and traditional). The study's participants were 40 first-year students enrolled in the Metal Technology Department at Rajamangala University of Technology Phra Nakhon Thailand. All students were doing a virtual reality module within one course and traditional lecture within another. The students completed a cognitive style test (Group Embedded Figures Test) which classified students as either field-dependent (FD) or field-independent (FI). Students also completed a questionnaire designed to measure motivation and attitude. The sample included 20 field-independent and 20 field-dependent students. Results indicated that those FD students were more motivated than were FI students towards the Virtual reality learning environment versus a traditional lecture, they also held more positive attitudes. However, the difference between the two was not significant.

Keywords: Virtual reality environment, motivation, attitude, cognitive styles, Group Embedded Figures Test, field-dependent, field-independent,

INTRODUCTION

The purpose of this study was to identify if there were differences in student motivation and attitude related to virtual versus traditional learning in students with varying cognitive styles. Participants were 40 first-year students enrolled in Metal Technology program at Rajamangala University of Technology Phra Nakhon Thailand. All students were doing a virtual reality module within one course and traditional lecture within another.

Witkin (1981) considers cognitive style as personal approach to collecting and organizing information. Kunlen (1968) defines cognitive style as the general tactic employed by a person to deal with cognitive work or to study the situation. The method often reflects certain personal characteristic. It dictates the way an individual accepts information input from the environment, the way an individual organizes and processes the information and experience, and the performance of the overall cognitive behavior.Among the earliest cognitive styles recognized, field-independent and field-dependent cognitive styles had received more attention of researchers than other styles (Witkin, 1981).

The purpose of field-independence and field-dependence test is to measure the ability of test subjects' to overcome background-irrelevant elements when they attempt to identify relevant components from

the situation. The more they are immune to influence of irrelevant elements, the more they are considered analytical; the more they are dependent on or influenced by irrelevant elements, the more they are considered global. Field-independent and field-dependent people demonstrate significantly different characteristics in their cognitive styles. Significant discrepancies are also observed in terms of their learning, thinking and behaviour. Evangelos (2003), Amory (1999) and Saracho (1991) in their studies identify characteristics of students of field-independent and field-dependent cognitive knowledge of the concept in order to successfully styles as shown in Table 1.

Table 1: *Comparison of Characteristics of FI Students and FD Students*

Field-Independent Students (FI Students)	**Field-Dependent Students (FD Students)**
Discrete thinking	Comprehensive thinking
Can better grasp inner motive; can single out components of the facility and their relationship with the organizational background.	Require external assistance. Perception can be easily dominated by the overall organization of the surrounding facility. All components of the facility are deemed integrated.
Approach the environment via analytical method.	Approach the environment via a more global method.
Can better develop self-defined goal and self-empowering.	Require external goal and empowering.
Prefer explanatory meta-instruction unit.	Learn more from explanatory introduction unit.
More independent in development of cognitive reconstruction skill.	More capable and active in development of human relationship skill.
Prefer independent learning.	Prefer group-cooperation learning.

ATTITUDE

The attitude that is often used in conjunction with motivation to achieve is *self-efficacy*, or how capable people judge themselves to be to perform a task successfully (Bandura, 1977). Bandura (1997) provides extensive evidence and documentation for the conclusion that self-efficacy is a key factor in the extent to which people can bring about significant outcomes in their lives. Specifically, there is considerable evidence to support the contention that self-efficacy beliefs contribute to academic achievement by enhancing the motivation to achieve. For example, Schunk (1989) in a number of studies, has shown that children with the same level of intellectual capability differ in their performance as a function of their level of self-efficacy.

MOTIVATION

The motivation is the positive or negative needs, goals, desires and forces that impel an individual toward or away from certain actions, activities, objects or conditions. The inner needs and wants of an individual what affects behaviour. Motivation is an abstract concept that is difficult to measure in any meaningful way (Ball, 1977) It is possible to observe a person's behaviour.

METHOLOGY

Participants

The initial group of participants were 74 first-year students enrolled in the department of Metal Technology at Rajamangala University of Technology Phra Nakhon Thailand. All participants were enrolled in a beginning welder’s course. This course is delivered using a traditional lecture method.

Procedures

Phase 1

Instructors informed their students about the study. They explained that the experiment would take about thirty minutes to administer. Students were tested in groups. First, they read and signed an informed consent form, supplied demographic information and asked any questions they may have had. Each The Group Embedded Figures Test (GEFT) booklet contained a non-identifying participation number to ensure anonymity and confidentiality. The students provided information about their name, major and date of birth in the space provided.

In their name lists they had to put their Grade Point Averages (GPAs). They were assured of the anonymity and the confidentiality of their responses.

The students received both verbal and written instructions for the GEFT. A short practice session preceded the two experimental portions of the test. In each experimental section, the students were given five minutes to locate and identify the simple objects embedded within the complex object. Following the completion of the booklet, students were dismissed.

The Group Embedded Figures Test (GEFT) is a frequently utilized instrument to measure an individual's degree of field-dependency. It was developed by Witkin, Oltman and Raskin (1971) and is designed to measure individuals' levels of field independency by tracing simple forms in larger complex figures. The test includes 18 items. A maximum score of 18 indicates field independence, higher scores indicate higher degrees of field-independence. The test classifies individuals scoring below 13 as field-dependent and those scoring above 13 as field independent.

Participants who take the GEFT are asked to identify a series of simple figures within more complex forms as shown below in Figure 1.

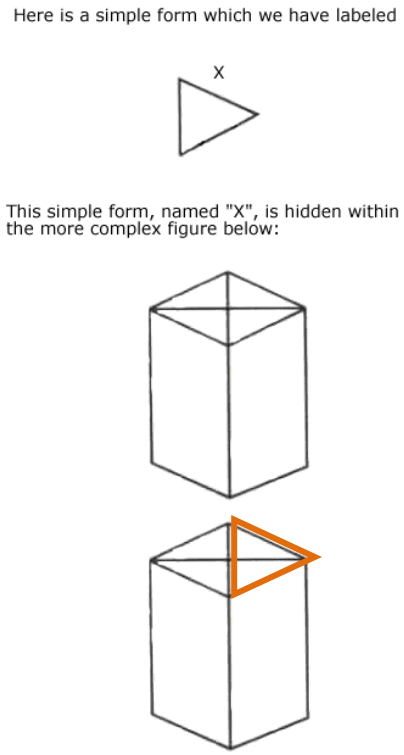

Figure 1 The Group Embedded Figures Test (GEFT)

Phase 2

We calculated the scores for the GEFT for each student and then classified them as either field-dependent of field independent. We then divided students into two groups depending on their cognitive styles (i.e. whether they were field dependent or field independent as well as according to their GPAs.

The results shown in Table 2 indicate that there were a higher percentage of students with Field-Dependent cognitive styles (FD) than Field-Independent cognitive styles (FI). The result from the GPAs showed that most of the students with low GPAs had a Field-Dependent cognitive style (FD). Next, we then eliminated 34 students from the sample. We did this in order to avoid a GPA effect in the study. It was not within the scope of this study to investigate on the basis of gender therefore we grouped males and females. The final sample for the study was 40 students.

***Table 2**: Description of Field-Dependent (FD) and Field-Independent (FI) Respondents by GPAs and Gender (n = 74)*

Variable	Description	Total		Cognitive styles			
				FD		FI	
		n	%	n	%	n	%
GPAs	High	29	39%	18	62%	11	38%
	Low	45	61%	33	73%	12	27%
Total		**74**	**100%**	**51**	**69%**	**23**	**65%**

Phase 3

All participants were then invited to play the X-mission game in a computer laboratory all at the same time.

Within this course, we provided participants with the opportunity to use a game-based virtual reality module called The X-mission. The game was created by one of the authors of this paper. The game aims to facilitate learning safety in the welding lab. It also aims to improve the students' self-learning, problem-solving, and information technology skills. In the game, students have an avatar as a young knight (see Figure 2).

Figure 2: The X- mission's young knight

Each player plays the role of a knight who has to save the lives of others in the lab (see Figure 3). The whole game typically requires one hour of play. At the end, the system assesses the students' achievement in relation to their safety skills in the welding lab.

Figure 3: Computer's avatar

Phase 4

In this phase, students completed closed and open questionnaires using a likert scale concerning their experiences, and a discussion followed. The purpose of administering the questionnaire was to determine if students were more motivated by the game than by the traditional classroom lecture. The questionnaire was created by (The author). It includes 20 items. The questionnaire is designed to measure motivation and attitude towards learning. In this case, we wanted to see if field dependence is related to motivation and attitude towards learning i.e. are for example, field independent students more or less motivated by virtual than by traditional learning?

ANALYSES

The GEFT scores were calculated by simply tabulating items. The responses to the questionnaires were analysed using descriptive statistics and T-tests to determine significance.

RESULTS

Tables 3 and 4 illustrate that FD students were more motivated than FI students towards the Virtual reality learning environments versus a traditional lecture. They also held more positive attitudes. However, Tables 3 and 4 illustrate that the difference between the two was not significant.

Table 3: *Means, Standard Deviations, and t-test for Respondents' Motivation by Field-Dependent (FD) or Field-Independent (FI) Learning Style (n = 40)*

Statement	Total		Learning Style				t-value
			FD		FI		
	Mean(SD)		Mean(SD)		Mean(SD)		
	Before VR class	After VR class	Before VR class	After VR class	Before VR class	After VR class	
1. I want to get better grades than other students	4.15(1.01)	4.21(1.01)	4.16(1.00)	4.26(0.96)	4.14(1.02)	4.18(1.04)	
2. I expect to do well in	3.61(0.85)	3.77(0.84)	3.66(0.84)	3.78(1.00)	3.56(0.86)	3.76(0.76)	

Statement	Total		Learning Style				t-value
			FD		FI		
	Mean(SD)		Mean(SD)		Mean(SD)		
	Before VR class	After VR class	Before VR class	After VR class	Before VR class	After VR class	
this class							
3. Studying appropriately, I can learn the material	3.53(0.87)	3.70(0.89)	3.45(0.85)	3.43(0.84)	3.60(0.89)	3.82(0.89)	
4. I prefer course material that arouses my curiosity	3.49(0.75)	3.66(0.80)	3.33(0.67)	3.48(0.67)	3.64(0.83)	3.75(0.84)	
5. I am satisfied with trying to understand content	3.23(0.67)	3.49(0.80)	3.21(0.50)	3.48(0.67)	3.25(0.83)	3.49(0.86)	
6. Course material is useful to learn	3.44(0.79)	3.49(0.83)	3.44(0.82)	3.52(0.85)	3.45(0.76)	3.47(0.83)	
7. I think of the questions I cannot answer[a]	3.29(0.95)	3.30(1.08)	3.27(0.89)	3.30(1.15)	3.30(1.01)	3.29(1.01)	
8. I am interested in the content area of this course	2.9(0.98)	3.14(0.93)	2.87(1.00)	3.00(0.95)	2.93(0.95)	3.20(0.92)	
9. I think of how poorly I am doing[a]	2.65(0.99)	2.81(1.51)	2.64(1.02)	2.83(1.67)	2.66(0.95)	2.78(1.35)	
Total	3.364(0.87)	**3.48(0.52)**	**3.4(0.84)**	**3.43(0.57)**	**3.39(0.90)**	**3.51(0.50)**	**-0.64**

Note: Scale 1=Not at all typical of me, 2=Not very typical of me, 3=Somewhat typical of me, 4=Quite typical of me, and 5=Very much typical of me.

[a] Negatively stated items. Means of these statements were reversed in the total mean.

Table 4: *Means, Standard Deviations, and t-test for Respondents' Attitude by Field-Dependent (FD) or Field-Independent (FI) Learning Style (n = 40)*

Statement	Total	Learning Style		t-value
		FD	FI	
	Mean(SD)	Mean(SD)	Mean(SD)	
1. Learning through Virtual reality environment instruction is convenient	4.03(1.11)	4.04(0.82)	3.98(0.97)	

Statement	Total	Learning Style		t-value
		FD	FI	
	Mean(SD)	Mean(SD)	Mean(SD)	
2. Virtual reality environment courses allow me to control the pace of my learning	4.00(0.92)	4.13(1.25)	3.98(1.05)	
3. Virtual reality environment courses should be utilized more often to deliver instruction	3.69(0.89)	3.91(0.60)	3.59(0.98)	
4. I will recommend Virtual reality environment courses to my friends	3.62(1.00)	3.78(0.95)	3.55(1.03)	
5. Virtual reality environment courses provide me with learning opportunities that I otherwise would not have had	3.57(1.11)	3.61(1.16)	3.55(1.10)	
6. I enjoy learning from the Virtual reality environment lessons	3.49(1.06)	3.83(0.83)	3.33(1.13)	
7. I will enrol in another Virtual reality environment course	3.27(1.01)	3.30(0.88)	3.25(1.07)	
8. I feel isolated as a student when I take courses via the web[a]	3.01(1.20)	2.91(1.20)	3.06(1.21)	
9. I would not have taken Virtual reality environment courses if I had some other means of acquiring course credits[a]	2.80(0.99)	2.61(0.89)	2.88(1.03)	
10. I prefer Virtual reality environment courses to traditional classroom instruction	2.65(1.05)	2.87(0.87)	2.55(1.12)	
11. Learning through Virtual reality environment courses is boring[a]	2.62(1.02)	2.35(1.07)	2.75(1.00)	
Total	**3.49(0.64)**	**3.60(0.60)**	**3.37(0.68)**	**1.38**

Note: Scale 1=Strongly disagree, 2=Disagree, 3=Undecided, 4=Agree, and 5=Strongly Agree.

[a] Negatively stated items. Means of these statements were reversed in the total mean.

DISCUSSION

Our assumption at the beginning of this study was that FD students would be more motivated by and more attitude toward Virtual based learning. We assumed this because Virtual based learning need student to defuse goals and FI students, they can self structure maybe practically useful in virtual environment, However we also know that FD students best with social context. Our virtual environment did not offer social environment but student work individually. If our virtual environment had included social part for example; student could have interact together socially. They may have been more significant difference. This means that to effect motivation and attitude of FD in virtual environment should provide socially environment such as online chatting.

CONCLUSION, LIMITATIONS AND IMPLICATIONS

The purpose of this study was to identify differences in student motivation and attitude in relation to cognitive styles between two types of instruction (virtual and traditional). The study's participants were 40 first-year students enrolled in Metal Technology program. All students were doing a virtual reality module within one course and traditional lecture within another. The students completed a cognitive style test (Group Embedded Figures Test) which classified students as either field-dependent (FD) or field-independent (FI). Students also completed a questionnaire designed to measure motivation and attitude. The sample included 20 field-independent and 20 field-dependent students. Results indicated that FD students were more motivated than FI students towards the Virtual reality learning environment versus a traditional lecture. They also held more positive attitudes. However, the difference between the two was not significant.

This study was limited to 40 students in a metal technology Department. The results may have been different if the study had been conducted with students in another discipline. Researchers may wish to see if they can confirm or refute our results by conducting studies in other disciplines. We began our study with a group of 74 students but subsequently eliminated 34 of these so that achievement as measured by GPA would not affect our results. If we had worked with the larger group of 74, our results may have been different. It follow-up studies might focus exclusively on students of high GPA or with only low GPA to see if results are significant in that context. Our study was conducted in Thailand. It is possible that results would be different with students of a different cultural group.

Also, as noted in the discussion, the results may have been different if the virtual learning environment had been designed differently, for example, if it had included a social component. This would be our next step, i.e. to conduct the same study but with a game that is online and allows social interaction between students. Furthermore, we did not characterize the activities in the traditional classroom. We know that activities involved primarily lectures but we do not know, for example, if there were social activities in this class. A study with a range of styles of classroom instruction and a range of instructors might yield different results. It would be interesting to conduct a study which compares the virtual learning environment with a different style of traditional classroom.

We began with the assumption that simply because the learning took place in a virtual environment that this would appeal to the FD student. However, we found that this was not the case. We conclude therefore that perhaps virtual learning itself is not necessarily a predictor of motivation and attitude for FD students but that it is the way in which the virtual environment is designed that will determine the motivation and attitude of the FD or FI students. This means that if we want to appeal to, for example, the FD students, we will design the virtual learning to cater to the style of the FD students. This is a hypothesis that could be investigated in future studies.

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The Development and Evaluation of a Computer Instruction Package Using Multimedia for Teaching about Musical Instruments in Elementary School in Thailand

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ABSTRACT

In this paper, the authors present a study aimed at developing and evaluating a self-learning Computer Instruction Package (CIP) with multimedia. The evaluation focused on the quality of the multimedia, learning effectiveness as well as on students' satisfaction. The CIP was designed for the teaching of musical instruments to students in grades 4 and 5 in Thailand. The sample group consisted of 40 students randomly selected from grades 4 and 5 at a public school in Bangkok, Thailand. The CIP development process included five main steps: content analysis; instructional design; prototyping; implementation and; evaluation. The CIP's quality was evaluated by three multimedia and CIP experts. Results revealed that the quality of CIP was at a good level. Pre and post testing revealed that the CIP could help improve the students' learning effectiveness up to 66.67%. The CIP evaluation conducted with students revealed a high level of satisfaction. The style of narration presented along with images of the musical instruments encouraged students' interactivity with the package.

Keywords: Computer Instruction Package/ Musical Instruments/ E-Learning / Multimedia / Learning Effectiveness / Students' Satisfaction

INTRODUCTION

A Computer Instruction Package (CIP) is a form of Computer-Assisted Instruction (CAI) that relies on and emphasizes self-learning. The package was developed by using multimedia technology to increase learning effectiveness. A CIP encourages students to participate through self learning so students can study according to their own learning capability and at their own pace. Moreover, a CIP gives an opportunity for students to interact with and get feedback from lessons. Our assumption was that a CIP would be more attractive to students for this reason and would promote effective learning. One of the important things which enable students to understand concepts on a CIP is use of multimedia that can stimulate students' attention because it can allow students to have fun during learning. One of the important research aspects of CIP was the development of a multimedia CIP using the simile story model on a basic computer network (Kiattikomol, Thongkam, Boontharig, and Chinpakdee, 2007). The evaluation of this CIP showed that (1) the quality of the CIP was at a good level, (2) the CIP could help students improve their effectiveness by up to 61.42%, and (3) students' satisfaction was at the

very much level. The result of this evaluation revealed that the CIP developed by using simile story and multimedia could help students to imagine, understand, and remember the content easily.

Music is one of the major subjects in grades 4 and 5 in elementary schools in Thailand. However, one of the major problems in teaching this subject is that some schools lack musical instruments. As a result, some students lack the opportunity to practice and learn on local musical instruments. Furthermore, teaching music involves considerable content. Often, teachers cannot cover all the content in the classroom. It is for these reasons that we undertook our study. There have been other studies of the use of the computer to teach music. Some have focused on theory such as Multimedia Music Theory Teaching Project done at Indiana University (1996). Others have focused on university students such as Collins's paper on "Sound for Picture: Teaching Music in Art School" (2003). However, our study is unique in that it takes place in Thailand, relies on the use of multimedia and focuses on elementary students. Also, our CIP focused specifically on musical instruments.

RESEARCH METHODOLOGY

Population and sample:

The 40 participating students were randomly selected from grades 4 and 5 at a public school in Bangkok, Thailand. They had never studied the content which was presented on the CIP. Approximately 20 students were in grade 4 and 20 in grade 5.

The CIP development process:

The CIP development process developed by Tiranathanagul, Kiattikomol, and Yampinij (1999) consisted of five main steps as follows

1) content analysis
2) instructional design
3) prototyping on paper
4) CIP implementation
5) CIP evaluation.

1. Content analysis

This step involved three steps as follows:

1.1 Content brainstorming: This step which lasted for approximately two weeks included identifying the topics that related to the content of the music course. We relied on three experts (teachers from the school) for this purpose.
1.2 Concept drafting: Similar topics identified in the first step were grouped.
1.3 Content network analysis: All topics were ordered into a content network chart based on their priority in the study. The arrangement of topics followed either sequential or parallel order.

2. Instructional Design

This step involved two main steps as follows:

2.1 Strategic presentation plan with behavioral objectives and course flowchart drafting: This step included two sub-steps:
a) Knowledge Structure Design: The researchers divided the topics in the content network chart into four modules. Next, all four modules were arranged into the course flow chart. In each module, the researchers assigned the behavioral objectives that covered all topics in the module.

The behavioral objectives guided the researchers in the choice and design of the content presentation.

b) Learning Management System (LMS): A LMS was created to manage students' learning and to track their progress. Students could choose to register if they wanted to keep their learning records. Students could also study without registering if they did not want to keep their learning records.

2.2 Module presentation chart drafting: The researchers created a module content chart to give an idea of how the content would be presented in each module. Next, they designed an instructional techniques and media (text, VDO, image, animation, and audio) to present each topic. In this CIP, the researchers used multimedia. The sound was presented simultaneously with the image of the musical instrument. The intention was to stimulate students' continuous interaction with the package in order to allow them to more easily imagine, understand, and remember concepts. Each module consisted of 5 main parts including: (I) an introduction to the lesson, (II) major and additional content presentation, (III) reinforcement activity, (IV) summary, and (V) test.

3. Prototyping on paper

This step involved four smaller sub-steps as follows:

3.1 Script development (interactive subject frames): Paper-based scripts were developed.
3.2 Story development by using a storyboard technique: All paper-based scripts were organized into a sequence or parallel.
3.3 Content correctness, content validity and reliability check: All paper-based scripts were checked for content correctness by the content experts. Ten, grade 4 to 5 students checked the scripts for content validity and reliability. They were not part of the study's sample. They checked the scripts to ensure that they were meaningful and made sense to them.
3.4 Pre- and post- test item development: Test items were developed and evaluated for quality including difficulties, discrimination, validity, and reliability.

4. CIP Implementation

This step consisted of three smaller sub-steps as follows:

4.1 Authoring software selection: The researchers selected the authoring software, graphic software, and sound-editing software that could implement all paper-based scripts on a computer system as a courseware package.
4.2 Preparing acquisition of ready made or tailor-made media: Before developing a CIP on a computer system, the researchers had to create all the media such as text, video, animation, image, and audio that would be included in the CIP.
4.3 Completion of CIP development: The researchers developed the CIP in the form of CD-ROM by using the authoring software and media.
4.4 A questionnaire development: A questionnaire was developed to measure students' satisfaction. The questionnaire consisted of nine main items on a five-point Likert scale.

5. CIP Evaluation

5.1 Quality evaluation: The multimedia quality of the CIP was evaluated by three experts with experience in instructional design and multimedia. The experts evaluated the CIP multimedia quality by filling in a quality form after they used the CIP. Items related to sound quality, animation and interactivity etc.

5.2 Small group rehearsal testing: Ten students not in the sample but from grades 4-5 were randomly selected to test the CIP evaluation process. The rehearsal step was designed to give the researchers an opportunity to ensure that the evaluation process was well prepared.

5.3 Evaluation of the CIP: This step involved a number of sub-steps as follows:

a) All 40 students completed a pre-test designed to assess their prior knowledge of the contents of the package.

b) All students used the CIP independently each day for four days for approximately one hour.

c) After students completed all four modules, they then did the post-test.

d) They then completed a questionnaire designed to rate their satisfaction with the CIP.

d) Pre- and post- test results using descriptive statistics were analysed to evaluate students' learning effectiveness (E_{post} - E_{pre}).

e) The questionnaire was analysed to identify students' satisfaction with the CIP.

5.4 Preparation of user's manual for publication: The user manual was developed for the CIP and prepared for publication.

RESULTS

Description of the CIP

The CIP for teaching music instruments consisted of four modules including

(1) Thai musical instruments
(2) Local musical instruments
(3) Western-style musical instruments
(4) Musical instruments maintenance.

Each module consisted of five main parts including

(I) an introduction to the lesson
(II) major and additional content presentation
(III) reinforcement activities
(IV) summary and
(V) test

In addition, the CIP included an LMS that supported registration, learning monitoring, and test management in order to evaluate students' achievement.

The figures below illustrate some of the content of the CIP.

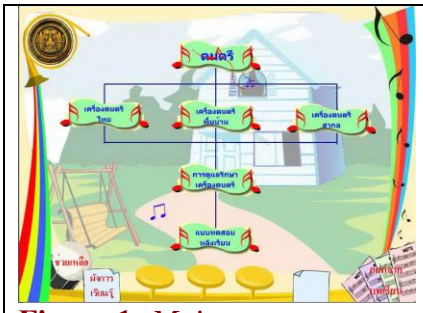

Figure 1: *Main menu screen*

Figure 2: *Submenu screen*

Figure 3: *Content presentation screen*

Figure 4: *Content presentation screen*

Figure 5: *Content presentation screen*

Figure 6: *Content presentation screen*

Figure 7: *Reinforcement activity screen*

Figure 8: *Reinforcement activity screen*

Figure 9: *Summary screen*

Figure 10: Test screen

Result of CIP quality evaluation

The results of the CIP quality evaluation showed that experts evaluated the CIP quality at a good level (4.41/5). When the researchers considered each quality item, they found that there were three quality items at a very good level and six quality items at a good level as shown in Table 1.

Table 1: *Mean of experts' evaluations and level of quality.*

Quality Item	Mean	Level of Quality
1. Introduction	4.83	Very Good
2. Reinforcement	4.67	Very Good
3. Animation	4.53	Very Good
4. Audio	4.43	Good

5. Video	4.39	Good
6. Interactivity	4.33	Good
7. Text	4.22	Good
8. Image	4.17	Good
9. Screen composition	4.13	Good
Average Of Mean	**4.41**	**Good**

Result of students' learning effectiveness

The result showed that the efficiency of students before the learning process (E_{pre}) was 17.86 and after the learning process (E_{post}) was 84.53. The difference of the two values showed that the students' learning effectiveness was 66.67. This indicated that the CIP could enable the sample group to increase their learning effectiveness.

Table 2: *Efficiency of pretest and posttest and the learning effectiveness.*

Item	**Efficiency**	**Learning effectiveness**
Pretest (E_{pre})	17.86	66.67
Posttest (E_{post})	84.53	

Result of students' satisfaction

The result showed that students were satisfied with the presentation in the CIP at a high level (4.31/5).

Table 3: *Mean of students' satisfaction and level of satisfaction.*

Satisfaction Items	**Mean**	**Level of Satisfaction**
1. Multimedia in the introduction enabled students' interest in the CIP.	4.48	High
2. Narration was clear and attracted students' attention.	4.35	High
3. Video presentation showed clearly the steps of playing the musical instruments.	4.35	High
4. The multimedia summary helped students to understand and memorize the concepts.	4.35	High
5. The matching activity reinforced learning adequately.	4.30	High
6. In the test, students could choose to not answer questions by sequence to allow freedom and flexibility.	4.27	High
7. The combination of image, text and narration explained the concepts more clearly.	4.25	High
8. Music stimulated students' motivation.	4.23	High
9. The menu and submenu helped students to understand the learning priority and topic relationship.	4.20	High
Average Of Mean	**4.31**	High

DISCUSSION, CONCLUSION, AND IMPLICATION

The purpose of the study presented in this paper was to develop and evaluate a self-learning Computer Instruction Package (CIP) with multimedia. The evaluation focused on the quality of the multimedia, learning effectiveness as well as on students' satisfaction. The CIP was designed for the teaching of musical instruments to students in grades 4 and 5 in Thailand. The sample group consisted of 40 students randomly selected from grades 4 and 5 at a public school in Bangkok, Thailand. Results revealed that the quality of CIP was at a good level. Pre and post testing revealed that the CIP could help improve the students' learning effectiveness by up to 66.67%. The CIP evaluation conducted with students revealed a high level of satisfaction. The results revealed that multimedia could help students to imagine, understand, and remember the concepts easily because it could engage students as well as explain and demonstrate steps in playing musical instruments in the way that was easy for students to understand. Moreover, as a form of e-learning, the CIP could serve many students at one

time. This result of this research was relevant to the previous research (Kiattikomol, Thongkam, Boontharig, and Chinpakdee, 2007).

The quality of the CIP is a result of the following:

The CIP development process was well organized in five main steps and each step had been checked and controlled by the experts. This process showed that the development had a quality control in itself. The instructional process consisted of five main parts including; introduction to the lesson; major and additional content presentation; reinforcement activity; summary and; test. These parts completed the learning process. The CIP was designed in a user-friendly manner and enabled students to control the learning process by themselves. This could make students feel free to learn. The content presentation was in multimedia format. Use of multimedia could explain difficult concepts in a way that students could easily understand and memorize content. Moreover, multimedia could make the CIP more attractive and encourage students to persist with the package. The reinforcement activities of the CIP enabled students to interact with the CIP and get feedback about supplementary content. In the test, students were not required to answer questions sequentially and could change answers before confirming all answers in the electronic answer sheet. This approach was designed to put students at ease and to decrease test pressure.

In terms of the limitations of our study, we only tried our package with students in grades four and five. We do not know how effective it might be for other grades. However, testing the package in other grades may constitute a next step for our research. As well, we only tested the package in one school. Trials on a larger scale might yield different results. The content was closely tied to the Thai curriculum. However, the principles of our approach and the general design of the CIP serve as a prototype that could be replicated in other curriculum contexts in other countries. In terms of our method, we did not use a control group that was instructed in a similar content. That approach would have been beyond the scope and purpose of our study but it is an approach that others may wish to investigate. Our CIP was designed to be used as a self-learning package and therefore did not involve any collaborative activities. Other CIPs might be developed that could serve this function.

In terms of implications, we believe that our CIP could be used widely in schools in this country. Its implementation and ease of use would require little or no training of teachers. However, others wishing to create modules such as ours should recognize the extensive costs in terms of human resources that the development of such a CIP involves. If the CIP were to be used on a large scale with a large number of students, then the costs involved would be justified.

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Effects of Personal Characteristics on Learner Online Learning Readiness

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ABSTRACT

Nowadays many educational institutions have embraced online education to cater for flexible and student-centered learning. Through online education, students have an opportunity to gain an education at their own convenience, in terms of time and place. However, it is argued that students are less satisfied with online learning than with traditional classroom learning. As online education continues to expand, the need for determining and maintaining quality online education is becoming an important issue. Therefore, it is important to discern which qualities are necessary for students' achievement and satisfaction in an online learning environment (OLE). While numerous studies on the qualities of online learners have been conducted, the factors that contribute to success in OLEs have not been adequately described. Therefore, it is important to examine learner characteristics to see their effects on student success in an online environment, which in turn facilitates high quality of online learning. This paper reports on what and how personal characteristics significantly affect students' online learning readiness at Curtin University of Technology, Sarawak Malaysia. Natural sampling was used to identify the sample and the study sample consisted of 350 voluntary participants. Quantitative method was used to collect relevant data in this study. A questionnaire was developed to gather data on learner personal characteristics, and a diagnostic tool, Tertiary Students' Readiness for Online Learning (TSROL), developed by Hitendra Pillay, Kym Irving and Megan Tones was adopted to assess learner online learning readiness. The TSROL has 20 items grouped into four factors: Technical skills (TS), Computer self-efficacy (CS-E), Learning preferences (LP) and Attitudes towards computers (AC). Moreover, confirmatory data analysis was adopted in this study. A one- way analysis of variance (ANOVA) was used to determine if there were significant differences in online learning readiness across the personal characteristics. The statistical results validate that some personal characteristics significantly affect learners' online learning readiness.

Keywords: Online learning; E-learning; Student readiness; Online student characteristics; Online student success

INTRODUCTION

Advances in information technologies, such as the World Wide Web and online communication tools, have changed the face of education all the time, creating an anywhere-and-anytime learning environment. It provides easier and more convenient access for many students who are unable to attend traditional classes. In addition, the use of IT in teaching and learning is widely recognized as a major contributor to flexible, student-centered learning. Nowadays students are increasingly distributed globally and have very diverse learning needs and learning styles, so flexible online learning solutions are required to meet their needs. As distance education, especially online education, continues to expand, attention must be given to provide an insight into determining and maintaining quality in the process of designing, developing, and delivering online education. Several online distance-education courses failing to meet quality standards set by researchers and institutions were reported (Garrett 2004, Oliver 2005). Numerous studies have mentioned a broad range of factors that

may influence the quality of online learning experience. Student characteristics have been identified as one of the important considerations for quality online education.
While the study results in relation to online student success are sometimes conflicting, the concern for student success in online education continues to be a focus of research. This study analyzed the personal characteristics that affected online learning readiness, which is imperative to academic achievement and satisfaction within online learning environments, with regard to two main objectives. The first objective was to determine if there were significant differences in online learning readiness, in terms of technical skills, computer self-efficacy, learning preferences and attitudes towards computers, across the personal characteristics, based on the participants' gender, age, learning style, course year level and financial aid status. The second objective was to locate the source of the significant differences in online learning readiness.

Research Questions:

Will there be significant differences in online learning readiness, in terms of technical skills, computer self-efficacy, learning preferences and attitudes towards computers, across the personal characteristics, based on the participants' gender, ethnicity, learning style, course year level and financial aid status?
Where do the significant differences lie in online learning readiness?

In order to address the first research question, the following hypotheses were stated:
H_1: There will be significant differences in online learning readiness based on the participants' gender.
H_2: There will be significant differences in online learning readiness based on the participants' ethnicity.
H_3: There will be significant differences in online learning readiness based on the participants' learning style.
H_4: There will be significant differences in online learning readiness based on the participants' course year level.
H_5: There will be significant differences in online learning readiness based on the participants' financial status.

LITERATURE REVIEW

Nowadays many educational institutions have embraced online education to cater for flexible and student-centered learning. Through online education, students have an opportunity to gain an education at anytime and in any place (Harrell 2006). Online learning environments (OLEs) vary depending on the design, technical infrastructure and pedagogical use, in terms of soundness and user friendliness, by educators (Pillay et al. 2007). However, recent evaluations of online learning argue that students are less satisfied with online learning than with traditional classroom learning (Summers et al. 2005), and such student dissatisfaction has the potential to affect attrition, resulting in lost time and funds to the institution and the student (Watkins et al. 2004). Therefore, it is important to discern which qualities are necessary for students' achievement and satisfaction in an online learning environment.

Current definitions of online learning readiness focus on the ability to manage time and adapt to the self-directed nature of online learning, including understanding personal learning styles and experiences (Pillay et al. 2007). Self-directed learners have "the skills to access and process the information they need for a specific purpose" (Connor 2004). The readiness of learners must be taken into account in the move to online learning and it can be unwise for universities to impose online learning on students without first addressing their needs and concerns (Oliver 2001). It was revealed that only about 60% of university students reported the levels of skills and expertise in technology use required for self-sufficiency in online learning (Oliver & Towers 2000). Student's readiness is an imperative factor for participation in learning. It was suggested that one of the eight principles of learning is readiness (Moss 1987) and students will learn better if they are ready to learn.

The literature (CHEA 2002, Fresen 2005, Meyer 2002) has mentioned a broad range of factors (i.e., institution, technology, instructor, student, support system, and course structure) that can influence the quality of online learning experience. In other words, student characteristics are one of the important considerations for the quality of online learning. Student achievement has been found to be associated with qualities of individual learners (Regional Educational Laboratory 2008). Empirical evidence of student readiness in OLEs has revealed some personal qualities imperative to achievement and satisfaction within such environments (Lee et al. 2002). Some of the essential characteristics that affect student success in OLEs (i.e., gender, age, education level, and learning style) have been investigated in the literature (Yukselturk & Bulut 2007).

While numerous studies on the qualities of online learners have been conducted, the factors that contribute to success in OLEs have not been adequately described. Furthermore, recent evaluations of online learning have shown that students are frequently less satisfied with online learning than with traditional classroom learning (Summers et al. 2005). As online education continues to expand, the need for determining and maintaining quality in the process of designing, developing, and delivering online education is becoming an important issue (Yukselturk & Bulut 2007). Therefore, it is important to examine learner characteristics to see their effects on student success in an online environment, which in turn facilitates high quality of online learning.

RESEARCH METHODOLOGY

Quantitative approach was adopted in this study. It can produce quantifiable, reliable data that are usually generalizable to some larger population (Weinreich n.d.). Reliability is one aspect of the credibility of the findings (Hussey & Hussey 1997: 57). The research methodology used in this study was survey whereby a sample of subjects was drawn from a population and studied to make inferences about the population. Group administered questionnaire was conducted in the classrooms, after class hours, where each respondent was handed an instrument and asked to complete it. If the respondents were unclear about the meaning of a question, they could ask for clarification.

Participants

The study included 304 volunteer students who enrolled in different courses at Curtin University of Technology, Sarawak Malaysia in 2007. All students had an intermediate level of English. Table 1 presents the demographic characteristics of the students. The number of female students (N = 163) was greater than the number of male students (N = 141), and the majority of the students were Chinese (N = 247). In addition, the majority of the students had a kinesthetic learning style (N = 191) and no financial aid (N = 228). 30.6% of these students enrolled in the 2nd year courses, followed by 25.3% in Pre-U courses.

Table 1: The characteristics of the students

	N	*P*
Gender		
Male	141	46.4
Female	163	53.6
Ethnicity		
Chinese	247	81.2
Malay	14	4.6
Indian	2	0.7
Malaysian ethnic group	24	7.9
Others	17	5.6
Learning style		
Auditory (learn by hearing)	38	12.5
Kinesthetic (learn by doing)	191	62.8
Visual (learn by seeing)	75	24.7
Course year level		
Pre-U	77	25.3
1st year	64	21.1
2nd year	93	30.6
3rd year	46	15.1
4th year	24	7.9
Financial aid status		
Yes	76	25
No	228	75

N: Number of volunteer students, *P*: Percentage of volunteer students

Variables

The independent variables in this study included gender, ethnicity, learning style, course year level, and financial aid status. Learning style was defined as the 'complex manner in which, and conditions under which, learners most efficiently and effectively perceive, process, store, and recall what they are attempting to learn' (James & Gardner 1995: 20). The Barsch Learning Style Inventory (Barsch 1996) was used to quantify learning style. Course year level is referred as the year level of a student enrolling in a course in 2007, while financial aid status is defined as if a student receives any financial aid for study.

The dependant variable in this study was online learning readiness, for which 4 major qualities were considered: Technical Skills (TS), Learning Preferences (LP), Computer Self-Efficacy (CS-E), and Attitudes towards Computers (AC). Generally these qualities may explain individual differences in academic achievement, completion rates and levels of satisfaction with online learning (e.g. Shih et al. 2006, Erlich et al. 2005, Summers et al. 2005). It is argued that 'online learners with relevant TS can achieve reasonable results, while students with lower levels of TS may either avoid the OLE or experience difficulty accessing course content' (Pillay et al. 2007). CS-E was defined as 'the learners' self-confidence in performing tasks and perceived ability to apply skills related to computers and other ICT technology' (Vuorela & Nummenmaa 2004a). Moreover, LP refers to self-management abilities (Loomis 2000) and levels of participation in online activities, such as discussion forum (Wang et al. 2004), which are crucial to online academic success. Again, AC was defined as 'student perceptions of ease of use and usefulness of technology' (Lee et al. 2002).

Survey Instruments

The data collection instrument used in this study was a questionnaire, consisting of two sections and a total of 25 items.

Section A: Personal characteristics
This section was intended to collect data on the participants' personal details (i.e., gender, ethnicity, learning style, financial aid status, and course year level). It consisted of 5 items.
Section B: Tertiary Students' readiness for Online Learning (TSROL)
TSROL (Pillay et al. 2006) was adopted as a diagnostic tool to assess learner online learning readiness. According to Pillay et al. (2006), "the TSROL has 20 items grouped into four factors: Technical skills (TS), Computer self-efficacy (CS-E), Learning preferences (LP) and Attitudes towards computers (AC)". It was highly reliable with the scale reliabilities, as measured by Cronbach's alpha level, for the four factors were as follows: TS, 0.92; CS-E, 0.88; AC, 0.78; and LP, 0.55.

Data Collection and Analysis

The students who agreed to participate in this study were distributed with questionnaires in the classrooms. Prior permission to contact the students to complete the study was obtained from the Ethic committee at Curtin University of Technology, Sarawak Malaysia. To encourage a better response rate, two follow-up emails were sent to the instructors, asking them to encourage their students to participate.

This study was designed to determine if there were significant differences in online learning readiness based on the participants' personal characteristics. The data were gathered through the use of questionnaires and entered into Microsoft Excel. Using the Statistical Package for the Social Sciences (SPSS), the data were imported from Microsoft Excel where the following descriptive statistics were used to describe the data: frequency distribution, means and standard deviations. A one-way analysis of variance (ANOVA) was used to determine if there were any significant mean differences between groups, based on gender, ethnicity, learning style, course year level and financial aid status, of any significant dependent variables, in terms of Technical Skills (TS), Computer Self-Efficacy (CS-E), Learning Preferences (LP), and Attitudes towards Computers (AC). Moreover, to locate where the significant differences lie, the Turkey HSD post-hoc analysis was adopted to hunt through the data. The data analyses of the study allowed the following to be determined:

the personal characteristics of the study population.
the determination of variables that were significant in online learning readiness.
if there were any significant mean differences of significant dependant variables based on participants' gender, ethnicity, learning style, course year level and financial aid status.

RESULTS

Descriptive Statistics

The following tables show the descriptive statistics of TSROL subscale scores, converted into 5-point Likert-type scale.

Table 2 shows the descriptive statistics (frequency distribution, mean, standard deviation, etc.) of the factors, technical skills (TS), computer self-efficacy (CS-E), learning preferences (LP), and attitudes towards computers (AC), of online learning readiness across the gender, "1" for male and "2" for female. It demonstrates that both male and female students tended to reflect an "agree" perspective towards CS-E (mean = 1.83278), AC (mean = 2.19243) and TS (mean = 2.47511). In addition, they tended to reflect an "undecided" perspective on LP, with the mean score 3.12389.

Table 2: Descriptive statistics of online learning readiness across the gender

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Computer Self-efficacy	1	141	1.89481	.861557	.072556	1.75136	2.03826	1.000	5.000
	2	163	1.77913	.614454	.048128	1.68409	1.87417	1.000	4.500
	Total	304	1.83278	.740383	.042464	1.74922	1.91634	1.000	5.000
Learning Preferences	1	141	2.95626	1.016471	.085602	2.78701	3.12550	1.000	5.000
	2	163	3.26890	.844217	.066124	3.13832	3.39947	1.000	5.000
	Total	304	3.12389	.939590	.053889	3.01784	3.22993	1.000	5.000
Attitudes towards Computers	1	141	2.18262	.785402	.066143	2.05186	2.31339	1.000	5.000
	2	163	2.20092	.697692	.054647	2.09301	2.30883	1.000	4.500
	Total	304	2.19243	.738482	.042355	2.10909	2.27578	1.000	5.000
Technical Skills	1	141	2.40631	.739747	.062298	2.28315	2.52948	1.000	4.714
	2	163	2.53462	.575929	.045110	2.44554	2.62370	1.143	4.571
	Total	304	2.47511	.659009	.037797	2.40073	2.54949	1.000	4.714

Table 3 shows the descriptive statistics of the factors of online learning readiness across the ethnic groups, "1" for Chinese, "2" for Malay, "3" for Indian, "4" for Malaysian ethnic group, and "5" for Others. The descriptive statistics revealed that Chinese, Malay, Malaysian ethnic group and foreign students (others) had a "strongly agree" perspective about CS-E, with mean scores ranging from 1.54862 to 1.87719. In addition, the students tended to reflect an "agree" perspective on AC (mean = 2.19243) and TS (mean = 2.47511). However, they had an "undecided" perspective towards LP, with the mean score 3.12389.

Table 3: Descriptive statistics of online learning readiness across the ethnic groups

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Computer Self-efficacy	1	247	1.87719	.722144	.045949	1.78669	1.96769	1.000	4.667
	2	14	1.80957	.942518	.251899	1.26538	2.35377	1.000	4.667
	3	2	2.00000	.236174	.167000	-.12194	4.12194	1.833	2.167
	4	24	1.54862	.600826	.122643	1.29492	1.80233	1.000	3.833
	5	17	1.58818	.948520	.230050	1.10049	2.07586	1.000	5.000
	Total	304	1.83278	.740383	.042464	1.74922	1.91634	1.000	5.000
Learning Preferences	1	247	3.07555	.935665	.059535	2.95829	3.19282	1.000	5.000
	2	14	2.95236	.702328	.187705	2.54684	3.35787	1.000	4.000
	3	2	3.00000	.000000	.000000	3.00000	3.00000	3.000	3.000
	4	24	3.27783	1.056020	.215559	2.83192	3.72375	1.000	5.000
	5	17	3.76465	.847862	.205637	3.32872	4.20058	1.667	5.000
	Total	304	3.12389	.939590	.053889	3.01784	3.22993	1.000	5.000
Attitudes towards Computers	1	247	2.25304	.739933	.047081	2.16030	2.34577	1.000	5.000
	2	14	2.10714	.560857	.149895	1.78331	2.43097	1.250	3.000
	3	2	2.25000	.000000	.000000	2.25000	2.25000	2.250	2.250
	4	24	1.91667	.779028	.159018	1.58771	2.24562	1.000	4.500
	5	17	1.76471	.640255	.155285	1.43552	2.09389	1.000	3.000
	Total	304	2.19243	.738482	.042355	2.10909	2.27578	1.000	5.000
Technical Skills	1	247	2.55178	.635661	.040446	2.47212	2.63145	1.000	4.714
	2	14	2.18357	.624908	.167014	1.82276	2.54438	1.429	3.571
	3	2	2.64250	.101116	.071500	1.73401	3.55099	2.571	2.714
	4	24	2.06554	.624763	.127529	1.80173	2.32936	1.000	3.429
	5	17	2.15971	.779072	.188953	1.75914	2.56027	1.286	4.429
	Total	304	2.47511	.659009	.037797	2.40073	2.54949	1.000	4.714

Table 4 shows the descriptive measures of online learning readiness factors across the learning styles, "1" for Auditory, "2" for Kinesthetic, and "3" for Visual. The results showed that the students of different learning styles inclined to have a "strongly agree" perspective about CS-E, with mean scores ranging from 1.81066 to 1.88219. An "agree" perspective was reflected towards AC (mean = 2.19243) and TS (mean = 2.47511), while an "undecided" perspective was reflected on LP (mean = 3.12389).

Table 4: Descriptive statistics of online learning readiness across the learning styles

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Computer Self-efficacy	1	38	1.84645	.752831	.122125	1.59900	2.09390	1.000	4.667
	2	191	1.81066	.682351	.049373	1.71327	1.90805	1.000	4.667
	3	75	1.88219	.872838	.100787	1.68136	2.08301	1.000	5.000
	Total	304	1.83278	.740383	.042464	1.74922	1.91634	1.000	5.000
Learning Preferences	1	38	3.30266	.981742	.159260	2.97997	3.62535	1.000	5.000
	2	191	3.12998	.936805	.067785	2.99628	3.26369	1.000	5.000
	3	75	3.01779	.922873	.106564	2.80545	3.23012	1.000	5.000
	Total	304	3.12389	.939590	.053889	3.01784	3.22993	1.000	5.000
Attitudes towards Computers	1	38	2.21711	.678261	.110028	1.99417	2.44004	1.000	4.250
	2	191	2.18848	.719428	.052056	2.08580	2.29116	1.000	5.000
	3	75	2.19000	.820802	.094778	2.00115	2.37885	1.000	5.000
	Total	304	2.19243	.738482	.042355	2.10909	2.27578	1.000	5.000
Technical Skills	1	38	2.53392	.663968	.107710	2.31568	2.75216	1.286	3.857
	2	191	2.47870	.591846	.042824	2.39422	2.56317	1.000	4.714
	3	75	2.43617	.809388	.093460	2.24995	2.62240	1.000	4.571
	Total	304	2.47511	.659009	.037797	2.40073	2.54949	1.000	4.714

Table 5 shows the descriptive statistics of online learning readiness factors across the course year levels, "1" for Pre-U, "2" for 1st year, "3" for 2nd year, "4" for 3rd year, and "5" for 4th year. The table demonstrates that the students of different course year levels tended to reflect a "strongly agree" perspective towards CS-E (mean = 1.83278), while they had an "undecided" perspective on LP (mean = 3.12389). Moreover, the students had an "agree" perspective about AC (mean = 2.19243) and TS (mean = 2.47511).

Table 5: Descriptive statistics of online learning readiness across the course year levels

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Computer Self-efficacy	1	77	1.78569	.434130	.049474	1.68715	1.88422	1.000	3.000
	2	64	1.80728	.623789	.077974	1.65146	1.96310	1.000	3.833
	3	93	1.98928	.993601	.103032	1.78465	2.19391	1.000	5.000
	4	46	1.64852	.665075	.098060	1.45102	1.84602	1.000	4.667
	5	24	1.79863	.735618	.150157	1.48800	2.10925	1.000	4.167
	Total	304	1.83278	.740383	.042464	1.74922	1.91634	1.000	5.000
Learning Preferences	1	77	3.19477	.755742	.086125	3.02323	3.36630	1.000	5.000
	2	64	3.21877	.875321	.109415	3.00012	3.43741	1.000	5.000
	3	93	3.35840	.887713	.092052	3.17558	3.54122	1.000	5.000
	4	46	3.13767	.971392	.143224	2.84921	3.42614	1.000	5.000
	5	24	1.70833	.538992	.110021	1.48074	1.93593	1.000	3.000
	Total	304	3.12389	.939590	.053889	3.01784	3.22993	1.000	5.000
Attitudes towards Computers	1	77	2.18831	.596255	.067950	2.05298	2.32364	1.000	4.500
	2	64	2.21484	.688435	.086054	2.04288	2.38681	1.000	4.500
	3	93	2.23656	.818739	.084899	2.06794	2.40518	1.000	5.000
	4	46	2.15217	.824079	.121504	1.90745	2.39690	1.000	5.000
	5	24	2.05208	.817536	.166879	1.70687	2.39730	1.000	4.000
	Total	304	2.19243	.738482	.042355	2.10909	2.27578	1.000	5.000
Technical Skills	1	77	2.54175	.517844	.059014	2.42422	2.65929	1.429	4.429
	2	64	2.55133	.673826	.084228	2.38301	2.71964	1.000	4.571
	3	93	2.51771	.753796	.078165	2.36247	2.67295	1.000	4.714
	4	46	2.23293	.581109	.085680	2.06037	2.40550	1.286	3.714
	5	24	2.35713	.698453	.142571	2.06219	2.65206	1.000	3.714
	Total	304	2.47511	.659009	.037797	2.40073	2.54949	1.000	4.714

Table 6 demonstrates the descriptive measures of online learning readiness factors across the financial aid status, "1" receiving a financial aid and "2" for not receiving a financial aid. The results revealed that the students of different financial aid status inclined to reflect an "agree" perspective on AC (mean = 2.19243) and TS (mean = 2.47511), and a "strongly agree" perspective about CS-E (mean =1.83278). However, they had an "undecided" perspective towards LP (mean = 3.12389).

Table 6: Descriptive statistics of online learning readiness across the financial aid status

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Computer Self-efficacy	1	76	1.75441	.709504	.081386	1.59228	1.91654	1.000	4.667
	2	228	1.85891	.750088	.049676	1.76102	1.95679	1.000	5.000
	Total	304	1.83278	.740383	.042464	1.74922	1.91634	1.000	5.000
Learning Preferences	1	76	2.85743	1.114138	.127800	2.60284	3.11203	1.000	5.000
	2	228	3.21271	.858246	.056839	3.10071	3.32471	1.000	5.000
	Total	304	3.12389	.939590	.053889	3.01784	3.22993	1.000	5.000
Attitudes towards Computers	1	76	2.13487	.714657	.081977	1.97156	2.29817	1.000	4.250
	2	228	2.21162	.746804	.049458	2.11417	2.30908	1.000	5.000
	Total	304	2.19243	.738482	.042355	2.10909	2.27578	1.000	5.000
Technical Skills	1	76	2.34209	.721609	.082774	2.17720	2.50699	1.000	4.714
	2	228	2.51945	.632260	.041872	2.43694	2.60196	1.000	4.571
	Total	304	2.47511	.659009	.037797	2.40073	2.54949	1.000	4.714

Results of a One-way Analysis of Variance (ANOVA)

To determine if there were any significant mean differences of dependent variables based on participants' gender, ethnicity, learning style, education level and financial aid status, ANOVA was completed. Independent variables were gender, ethnicity, learning style, course year level and financial aid status. The mean differences of the four significant dependent variables (TS, CS-E, LP and AC) based on the independent variables, gender, ethnicity, learning style, course year level, and financial aid status, were compared using ANOVA.

Research Question 1:
Will there be significant differences in online learning readiness based on the participants' gender?
H_0: There will be no significant differences in online learning readiness based on the participants' gender.
H_1: There will be significant differences in online learning readiness based on the participants' gender.

As shown in Table 7, the results revealed that there was significant mean difference of learning preferences, $F(1, 302) = 8.580$, $p = 0.004$, based on the participants' gender. Given that $p < 0.05$ the null hypothesis was rejected and the alternative hypothesis was accepted, which stated that learning preferences were significantly different across gender. In contrast, there were no significant mean differences in computer self-efficacy, $F(1, 302) = 1.851$, $p = 0.175$, attitudes towards computers, $F(1, 302) = 0.046$, $p = 0.830$, and technical skills, $F(1, 302) = 2.884$, $p = 0.091$, based on gender. Thus, given $p > 0.05$ the null hypotheses were accepted, which revealed no significant differences of CS-E, AC and TS for gender.

Table 7: ANOVA analyses of online learning readiness based on gender

		Sum of Squares	df	Mean Square	F	Sig.
Computer Self-efficacy	Between Groups	1.012	1	1.012	1.851	.175
	Within Groups	165.083	302	.547		
	Total	166.095	303			
Learning Preferences	Between Groups	7.390	1	7.390	8.580	.004
	Within Groups	260.108	302	.861		
	Total	267.497	303			
Attitudes towards Computers	Between Groups	.025	1	.025	.046	.830
	Within Groups	165.217	302	.547		
	Total	165.243	303			
Technical Skills	Between Groups	1.245	1	1.245	2.884	.091
	Within Groups	130.346	302	.432		
	Total	131.591	303			

Research Question 2:
Will there be significant differences in online learning readiness based on the participants' ethnicity?
H_0: There will be no significant differences in online learning readiness based on the participants' ethnicity.
H_2: There will be significant differences in online learning readiness based on the participants' ethnicity.
The ANOVA analyses, shown in Table 8, revealed significant differences of learning preferences, $F(4, 299) = 2.474$, $p = 0.45$, attitudes towards computers, $F(4, 299) = 2.793$, $p = 0.027$, and technical skills, $F(4, 299) = 5.107$, $p = 0.001$, based on ethnicity. Since $p < 0.05$, the alternative hypotheses were accepted, which indicated that there were significant effects of ethnic groups on LP, AC and TS. However, there was no significant difference of computer self-efficacy, $F(4, 299) = 1.612$, $p = .171$, based on ethnicity. Thus, the null hypothesis was accepted since $p > 0.05$.

Table 8: ANOVA analyses of online learning readiness based on ethnicity

		Sum of Squares	df	Mean Square	F	Sig.
Computer Self-efficacy	Between Groups	3.506	4	.876	1.612	.171
	Within Groups	162.589	299	.544		
	Total	166.095	303			
Learning Preferences	Between Groups	8.568	4	2.142	2.474	.045
	Within Groups	258.929	299	.866		
	Total	267.497	303			
Attitudes towards Computers	Between Groups	5.951	4	1.488	2.793	.027
	Within Groups	159.292	299	.533		
	Total	165.243	303			
Technical Skills	Between Groups	8.415	4	2.104	5.107	.001
	Within Groups	123.176	299	.412		
	Total	131.591	303			

Research Question 3:
Will there be significant differences in online learning readiness based on the participants' learning style?
H_0: There will be no significant differences in online learning readiness based on the participants' learning style.
H_3: There will be significant differences in online learning readiness based on the participants' learning style.
The analyses show that none of the dependent variables revealed significant differences for learning style: CS-E, $F(2, 301) = 0.257$, $p = 0.773$; LP, $F(2, 301) = 1.171$, $p = 0.311$; AC, $F(2, 301) = 0.024$, $p = 0.976$; TS, $F(2, 301) = 0.284$, $p = 0.753$, and thus the alternative hypotheses were rejected for $p > 0.05$. Table 9 shows the details of the ANOVA analyses.

Table 9: ANOVA analyses of online learning readiness based on learning style

		Sum of Squares	df	Mean Square	F	Sig.
Computer Self-efficacy	Between Groups	.284	2	.142	.257	.773
	Within Groups	165.811	301	.551		
	Total	166.095	303			
Learning Preferences	Between Groups	2.066	2	1.033	1.171	.311
	Within Groups	265.431	301	.882		
	Total	267.497	303			
Attitudes towards Computers	Between Groups	.027	2	.013	.024	.976
	Within Groups	165.216	301	.549		
	Total	165.243	303			
Technical Skills	Between Groups	.248	2	.124	.284	.753
	Within Groups	131.343	301	.436		
	Total	131.591	303			

Research Question 4:
Will there be significant differences in online learning readiness based on the participants' course year level?
H_0: There will be no significant differences in online learning readiness based on the participants' course year level.
H_4: There will be significant differences in online learning readiness based on the participants' course year level.
No significant differences were noted for course year level in computer self-efficacy, $F(4, 299) = 1.882$, $p = 0.113$, attitudes towards computers, $F(4, 299) = 0.346$, $p = 0.847$, and technical skills, $F(4, 299) = 2.292$, $p = 0.060$. Hence, the alternative hypotheses were rejected. Besides, there is strong evidence showing that there was significant mean difference of learning preferences, $F(4, 299) = 18.984$, $p = 0.000$, based on course year level. The results are shown in Table 10.

Table 10: ANOVA analyses of online learning readiness based on course year level

		Sum of Squares	df	Mean Square	F	Sig.
Computer Self-efficacy	Between Groups	4.080	4	1.020	1.882	.113
	Within Groups	162.015	299	.542		
	Total	166.095	303			
Learning Preferences	Between Groups	54.177	4	13.544	18.984	.000
	Within Groups	213.320	299	.713		
	Total	267.497	303			
Attitudes towards Computers	Between Groups	.762	4	.190	.346	.847
	Within Groups	164.481	299	.550		
	Total	165.243	303			
Technical Skills	Between Groups	3.914	4	.979	2.292	.060
	Within Groups	127.676	299	.427		
	Total	131.591	303			

Research Question 5:
Will there be significant differences in online learning readiness based on the participants' financial status?
H_0: There will be no significant differences in online learning readiness based on the participants' financial status.
H_5: There will be significant differences in online learning readiness based on the participants' financial status.
The statistical analyses show that there were significant differences of learning preferences, $F(1, 302) = 8.347$, $p = 0.004$, and technical skills, $F(1, 302) = 4.172$, $p = 0.042$, for financial aid status, and thus the null hypotheses were rejected. On the other hand, it is evident that there were no significant differences of computer self-efficacy, $F(1, 302) = 1.136$, $p = 0.287$, and attitudes towards computers, $F(1, 302) = 0.615$, $p = 0.434$, across financial aid status. Table 11 shows the details of the analyses.

Table 11: ANOVA analyses of online learning readiness based on financial aid status

		Sum of Squares	df	Mean Square	F	Sig.
Computer Self-efficacy	Between Groups	.622	1	.622	1.136	.287
	Within Groups	165.472	302	.548		
	Total	166.095	303			
Learning Preferences	Between Groups	7.194	1	7.194	8.347	.004
	Within Groups	260.303	302	.862		
	Total	267.497	303			
Attitudes towards Computers	Between Groups	.336	1	.336	.615	.434
	Within Groups	164.907	302	.546		
	Total	165.243	303			
Technical Skills	Between Groups	1.793	1	1.793	4.172	.042
	Within Groups	129.798	302	.430		
	Total	131.591	303			

Results of Post Hoc Test

To locate where the significance lies between the groups of independent variables, a Post Hoc test was conducted. The mean difference is significant at the 0.05 level.

As shown in Table 12, significant differences in the means were detected between Chinese and foreign students for LP, as well as between Chinese and Malaysian ethnic students for TS. This indicates that foreign students had significantly lower LP than Chinese students, who had significantly lower TS than Malaysian ethnic students. However, the results revealed no significant differences in the means between the groups of learning style for all dependent variables as shown in Table 13.

Table 12: Results of Turkey HSD test between the groups of ethnicity

Dependent Variable	(I) Ethnic group	(J) Ethnic group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Learning Preferences	1	2	.12320	.255660	.989	-.57847	.82486
		3	.07555	.660680	1.000	-1.73769	1.88880
		4	-.20228	.198969	.848	-.74835	.34380
		5	-.68909*	.233337	.028	-1.32949	-.04869
	2	1	-.12320	.255660	.989	-.82486	.57847
		3	-.04764	.703454	1.000	-1.97829	1.88300
		4	-.32548	.312951	.837	-1.18438	.53342
		5	-.81229	.335851	.113	-1.73404	.10946
	3	1	-.07555	.660680	1.000	-1.88880	1.73769
		2	.04764	.703454	1.000	-1.88300	1.97829
		4	-.27783	.684890	.994	-2.15753	1.60186
		5	-.76465	.695652	.807	-2.67388	1.14458
	4	1	.20228	.198969	.848	-.34380	.74835
		2	.32548	.312951	.837	-.53342	1.18438
		3	.27783	.684890	.994	-1.60186	2.15753
		5	-.48681	.294996	.467	-1.29644	.32281
	5	1	.68909*	.233337	.028	.04869	1.32949
		2	.81229	.335851	.113	-.10946	1.73404
		3	.76465	.695652	.807	-1.14458	2.67388
		4	.48681	.294996	.467	-.32281	1.29644
Technical Skills	1	2	.36821	.176333	.228	-.11574	.85216
		3	-.09072	.455683	1.000	-1.34135	1.15991
		4	.48624*	.137233	.004	.10960	.86288
		5	.39208	.160937	.109	-.04962	.83377
	2	1	-.36821	.176333	.228	-.85216	.11574
		3	-.45893	.485186	.879	-1.79053	.87267
		4	.11803	.215849	.982	-.47437	.71043
		5	.02387	.231643	1.000	-.61188	.65961
	3	1	.09072	.455683	1.000	-1.15991	1.34135
		2	.45893	.485186	.879	-.87267	1.79053
		4	.57696	.472382	.739	-.71950	1.87342
		5	.48279	.479805	.852	-.83404	1.79963
	4	1	-.48624*	.137233	.004	-.86288	-.10960
		2	-.11803	.215849	.982	-.71043	.47437
		3	-.57696	.472382	.739	-1.87342	.71950
		5	-.09416	.203465	.991	-.65258	.46425
	5	1	-.39208	.160937	.109	-.83377	.04962
		2	-.02387	.231643	1.000	-.65961	.61188
		3	-.48279	.479805	.852	-1.79963	.83404
		4	.09416	.203465	.991	-.46425	.65258

*. The mean difference is significant at the .05 level.

Table 13: Results of Turkey HSD test between the groups of learning style

Dependent Variable	(I) Learning style	(J) Learning style	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Computer Self-efficacy	1	2	.03578	.131836	.960	-.27474	.34630
		3	-.03574	.147788	.968	-.38384	.31236
	2	1	-.03578	.131836	.960	-.34630	.27474
		3	-.07152	.101139	.759	-.30974	.16670
	3	1	.03574	.147788	.968	-.31236	.38384
		2	.07152	.101139	.759	-.16670	.30974
Learning Preferences	1	2	.17267	.166802	.555	-.22021	.56556
		3	.28487	.186986	.281	-.15555	.72529
	2	1	-.17267	.166802	.555	-.56556	.22021
		3	.11220	.127964	.655	-.18920	.41360
	3	1	-.28487	.186986	.281	-.72529	.15555
		2	-.11220	.127964	.655	-.41360	.18920
Attitudes towards Computers	1	2	.02862	.131599	.974	-.28134	.33859
		3	.02711	.147523	.982	-.32037	.37458
	2	1	-.02862	.131599	.974	-.33859	.28134
		3	-.00152	.100957	1.000	-.23931	.23627
	3	1	-.02711	.147523	.982	-.37458	.32037
		2	.00152	.100957	1.000	-.23627	.23931
Technical Skills	1	2	.05522	.117336	.885	-.22114	.33159
		3	.09775	.131534	.738	-.21206	.40756
	2	1	-.05522	.117336	.885	-.33159	.22114
		3	.04252	.090015	.884	-.16950	.25454
	3	1	-.09775	.131534	.738	-.40756	.21206
		2	-.04252	.090015	.884	-.25454	.16950

In Table 14, the statistical results showed that significant differences in the means were detected among all course year levels for LP. That is, Pre-U through Year 3 students had significantly lower LP than Year 4 students.

Table 14: Results of Turkey HSD test between the groups of course year level

Dependent Variable	(I) Year level	(J) Year level	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Learning Preferences	1	2	-.02400	.142874	1.000	-.41612	.36812
		3	-.16363	.130142	.718	-.52081	.19355
		4	.05709	.157401	.996	-.37490	.48908
		5	1.48643*	.197465	.000	.94449	2.02838
	2	1	.02400	.142874	1.000	-.36812	.41612
		3	-.13963	.137182	.847	-.51613	.23687
		4	.08109	.163270	.988	-.36701	.52919
		5	1.51043*	.202174	.000	.95556	2.06530
	3	1	.16363	.130142	.718	-.19355	.52081
		2	.13963	.137182	.847	-.23687	.51613
		4	.22072	.152253	.596	-.19714	.63859
		5	1.65006*	.193386	.000	1.11931	2.18082
	4	1	-.05709	.157401	.996	-.48908	.37490
		2	-.08109	.163270	.988	-.52919	.36701
		3	-.22072	.152253	.596	-.63859	.19714
		5	1.42934*	.212689	.000	.84561	2.01307
	5	1	-1.48643*	.197465	.000	-2.02838	-.94449
		2	-1.51043*	.202174	.000	-2.06530	-.95556
		3	-1.65006*	.193386	.000	-2.18082	-1.11931
		4	-1.42934*	.212689	.000	-2.01307	-.84561

*. The mean difference is significant at the .05 level.

DISCUSSION AND CONCLUSION

In order to develop and design high-quality online learning environments (OLEs), it is imperative to investigate personal characteristics of successful online learners. In other words, research is needed to discover what will help student succeed in OLEs. This study was designed to investigate the effects of personal characteristics on learner online learning readiness at Curtin University of Technology, Sarawak Malaysia. Specifically, the research questions guiding the study were, "Are there significant differences in online learning readiness across the personal characteristics?" and "Where does the significance lie in online learning readiness?" From this research study, it can be concluded that the students of different personal characteristics tended to strongly agree having computer self-efficacy, while they had an undecided perspective towards learning preferences. In addition, it was found that the students inclined to agree having attitudes towards computers and technical skills.

In addition, it is evident that there was significant difference of learning preferences across four personal characteristics (gender, ethnicity, course year level and financial aid status), indicating that the four personal characteristics significantly affected students' learning preferences. Besides, it was found that there were significant differences of technical skills towards students' ethnicity and financial aid status. That is, students' ethnicity and financial aid status had significant effects on technical skills. Again, there was significant difference of attitudes towards computers across ethnic groups. However, no significant differences were noted for learning style in technical skills, computer self-efficacy, learning preferences and attitudes towards computers, indicating that learning styles had no significant effects on technical skills, computer self-efficacy, learning preferences and attitudes towards computers. Moreover, Chinese students scored significantly lower on learning preferences compared to foreign students, indicating that non Malaysian group may possess lower level of learning preferences than the Malaysian Chinese group. It is revealed that Malaysian Chinese group scored significantly higher on technical skills compared to Malaysian ethnic group. Again, Pre-U through Year 3 students scored significantly higher on learning preferences compared to Year 4 students. That is, Pre-U through Year 3 students may have lower level of learning preferences than Year 4 students.

As Davis and Wong (2007: 97) mentioned, 'online learning (e-Learning) has become a global phenomenon as many organizations and educational institutions worldwide have entered the field in an attempt to enhance the students' experience of learning'. Nowadays students are increasingly distributed globally and have very diverse learning needs and learning styles. So, flexible e-Learning solutions are required to meet their needs. However, 'it is not easy to determine and maintain quality in the process of designing, developing, and delivering these online learning opportunities for educational institutions' (Yukselturk & Bulut 2007). This study has identified some personal characteristics necessary for students' achievement and satisfaction in an online learning environment. Through this, potential barriers to student achievement, satisfaction or completion in OLEs can be detected and necessary measures can be taken to develop resources and strategies to address their needs. Because online learning is a relatively new phenomenon, particularly in many educational institutions, research is continually being conducted to develop a better understanding of the various aspects of OLEs. One aspect, significant personal characteristics of successful online learners, is constantly being studied to get a complete understanding of why some students are less satisfied with online learning. Moreover, this study will add to the body of knowledge of successful online learners' personal characteristics, effective OLEs, as well as research on online education. The identification of significant dependant variables can give educational institution administrators the ability to identify characteristics of students that may have a negative influence on their likelihood to persist in their online courses.

Limitations and Suggestions for Future Research

As Harrell (2006) mentioned, "every research study, particularly educational research, is limited in some way". Many of the survey items will ask to recall and assess their previous characteristics. This could result in responses that are not truly reflective of the student's characteristics during the time of the survey. Furthermore, a larger sample size with more classrooms involved will provide more valid and reliable information relevant to the questions asked in this study. Also, based on the methodology adopted, the Post Hoc test should be performed to compare the means of more than two groups or levels of an independent variable (Coakes & Steed 2003). However, there were only two groups for gender and financial aid status, and hence the Post Hoc tests were not performed.

Although the data analyses for this study resulted in some personal characteristics that were significant factors to affect online learning readiness, research in this area must be continued to ensure that these personal characteristics are significant in other study samples, including other community colleges within and outside Malaysia. While conducting the research, it is also beneficial to consider other personal characteristics (i.e., age, marital status, locus of control, motivational beliefs, no. of children, self-regulated learning components, computer experience and access, and previous online experience)

and qualitative feedback to deepen the understanding of significant factors towards online learning readiness.
This remains research for the future.

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Engaging the Community in University Teaching: A Cultural Approach to Sustainability of Effective Learning

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ABSTRACT

This paper revisits levels of education and sustainable development implementation in university teaching. It suggests tapping expertise in local communities as a social responsibility for sustainability of student's human development success. Where success is measured by the students'self-actualization progress. Student success, qualitative growth, or acquired capacities is seen as a prerequisite for sustainable development. We take a reformist point of view of sustainability. We look at issues of human behaviour, cognition and negotiation over preferred futures, under a given social policy and education act. Sustainability here is viewed as an inherently normative concept, rooted in real world problems with very different sets of values and moral judgments. We suggest ways of moving practice, our policies and decision in the direction of sustainability of effective learning, to provide systems of governance that propagate the values that people want to live by. The research design was ethnographic with sample drawn from four corners o f the country. The paper reports the result of a study on the influence of culture on cognition and language development. The relevance of the study to sustainability is the findings that those students, whose culture was included in the learning culture, were motivated to learn and had higher academic achievement. The paper presents a view that cultural elements ought to be major aims for future development of education knowledge, skills and fundamental attitude change. Culture should be mandatory for teachers in training if universities aim for effective learning. And the community should therefore be engaged as resource for effective learning.

Keywords: Problem – based sustainable development, effective learning through community engagement and successful human development through effective life skills.

INTRODUCTION

Teaching at any level of education is a challenging complex work. It is a process of imparting knowledge to the learners by the teacher. This process always takes place in a specific culture. Research has demonstrated that there is a connection between teaching expertise and what the students achieve and finally become (Norden and Hnsson, Network learning symposium 2006). However expertise is not equivalent to good teaching. Good teaching is defined differently by different cultures. The question arose about the goal of all the education reforms, presidential commissions and task forces that emphasized school success for all. Is this goal achieved and if not why. If it is achieved how is effective learning sustained. We engaged ethnographic procedures to collect analyse and interpret data. We just followed the data wherever it took us. Our investigation revealed a string of cultural patterns that were a barrier to effective learning. The issues of cultural self concept, worth and fitment in the community became dominant. We then used Maslow's theory of self actualization to understand the relationship between the education worth and the 'who am I culturally'. We suggested that the concept of sustainability or education for sustainable development would be fruitful in two related ways for solving the observed problems. First, it provides a focus for a series of concerns that

relate to the interconnected debates over environmental, social and economic conditions of sustainable development. The observed concerns are important and addressing them directly is a start for progress in student success and overall human development. Second, the debate over the concept and practice of sustainability narrows those concerns in a particularly pointed given way here in termed self-actualization. As this article unfolds we discuss sustainable development in the context of students' human development through the process of self-actualization. We also use examples of how the rest of the world is working toward ESD to strengthen our case.

STATEMENT OF THE PROBLEM

The problem addressed in this paper is the ways and factors that can promote learning effectiveness in universities. It is evident from literature that there is need to find methods that further the argument of multiple levels of implementing sustainable development, and the success of such implementation is measured by effectiveness if learning. The paper explores the possibility of engagement of the community in university teaching in order to address contemporary issues of learning effectiveness.

PURPOSE

The objective of this paper is to focus the lens of Education for sustainable development on the learner's experiences and achievement. By using the results of a culture study which form the basis of the paper's argument, the researchers seek to understand how the community can be engaged to promote quality learning outcomes

CONCEPTUAL FRAMEWORK

Universities and their staff are facing multiple new challenges as societies offer them new roles as drivers for development. They take on educational outreach tasks in greater numbers and with wider ambitions to shape the world we live in. Life-long learning, internationalization, educational flexibility, diversity among target groups, trans-disciplinarily in courses and research efforts, competence development in the work-place, transfer of skills and innovative use of information and communication technologies (ICT) are some of the issues that are of concern. And at the centre of these concerns is the shift from a focus on teachers in isolation in the academy to student's achievements and overall human development. The case in point is, what do students as individuals stand to gain in education for development. First what is education for development, and second how is it applied to the daily activities of classroom learning? The phrase sustainable development has many interpretations. In his review of articles dating as far back as 1987, Robinson (2004) stated that defining sustainable development is like trying to square a circle. He also pointed out that academics and NGOs prefer the term sustainability, to imply ability of humans to continue to live within environmental constraints. He perceived sustainability as an integrative concept, across fields, sectors and scales. The conventional definition of sustainable development derived from the 1987 Bruntland Report is development which meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). In practice, sustainable development is an unclear concept, involving multiple approaches and a variety of recommendations as to the ways forward (Williams & Millington, 2004). However three areas can be identified. These are economic growth, environmental degradation, and social issues and concerns for development. The decade of ESD has seen many projects, policies and plans addressing either any of the three elements or their connectedness.

The United Nations' Decade of Education for Sustainable Development was established in December, 2002, through Resolution no. 57/254.This resolution recommends UNESCO to elaborate a plan that would emphasize the role of education in fighting environmental degradation, economic divides, and social problems like poverty and other development concerns for humanity such as the right to education. The decade starts from 2005 and ends in 2015. It further states that it is important to create campaigns, and strategies and measures against unsustainability, by proposing alternative ways that

are humane and user friendly to the physical and social environments. Practice and research has shown that solutions that address only environmental, only social or only economic concerns are radically insufficient. What is needed is a form of transdisciplinary thinking that involves the development of new concepts, methods and tools that are integrative and synthetic, and actively creates a combined effort, (Robinson,2008).If sustainability is to mean anything to humanity, it must act as an integrating concept between the social dimensions, the biophysical dimensions and economic dimension of development. It is the idea of combined effort or synergy that brings the concept of engaging the community in university teaching. In this paper the concern is for effective learning for sustainable development. A question may be posed about who the community is and what would be their role in sustainable development? All sectors of the country population with interest in responsible human economic and ecological development form the community to be engaged. It is clear that governments alone have neither the will nor the capability to accomplish sustainability on their own. The private sector, as the chief engine of economic activity on the planet, and a major source of creativity, innovation and entrepreneurship, must be involved in trying to achieve sustainability. The society as the initiator, actor and end receiver of education for sustainable development cannot achieve the necessary sustainability alone. NGOs, politicians, also need to be engaged to achieve the goals of education for development. This has been echoed and expanded by Robinson (2008) by stating, "-this broad partnership must also involve the active participation of the research and teaching community. In virtually every area of sustainability, more research, and better-trained citizens, are needed. While not every researcher and teacher can or should be focused on these issues, there is a need for the academy to focus its attention more strongly on developing the knowledge, tools and training required to address the challenge of sustainability. It is clear that education for sustainability can never be a one man's show. All sectors of the community should contribute to a better life for all, the contribution should go beyond technical fixes, scientific clichés, and begin to address profound issues of opportunity, distribution, material needs, consumption, culture, and empowerment. These attributes of development speak directly to the existence and well being of an individual, Freirre, (1992; 1997). Literature illustrated that sustainable development is better addressed by seeking to develop individuals in a way that will not harm the earth or the ecosystem (Gadotti, 2008) In this paper the writers take the view that one way of implementing education for sustainability is to empower the students by considering their dreams in the context of their culture, by engaging the community to address profound issues of culture, student achievement and self actualization. Because upon school completion, they will be absorbed by the same community to participate in activities of development Gaddotti, (2008)

LEARNING CULTURE AND SUATAINABLE DEVELOPMENT

Culture is a very influential factor of development in every society. However it is not necessarily a popular topic to some sectors of the community and policy makers and country leaders.

Multiculturalists have advocated greater diversity and representation in the academic community, by increasing members of historically disadvantaged groups among faculty, staff, and students, and recognizing and addressing their distinctive intellectual and socially relevant interests. But it has often been associated with identity politics or advocacy of the interests of minority groups by their members. In both national and local politics, a representation of ideas and persons from varied cultures in specific institutions is a desired goal of multiculturalism. However multiculturalism has been opposed in academia, because it is believed to weaken traditional subject matter by watering down the established subjects and neglecting universal knowledge. This opposition has been largely from conservative white intellectuals. It seems international organizations supports multiple cultures in education. In the foreword of the project report *All Different, All Unique – Young people … UNESCO Universal Declaration on Cultural Diversity*, Kod'chiro Matsuura, express the following:

'The cultural diversity around us today is the outcome of thousands of years of human interaction with nature and among people with different customs, beliefs and ways of life …All cultures are creative and dynamic, but they are also unique, fragile and irreplaceable. A culture neglected for a single

generation can be lost forever. It is therefore crucial to create a safe environment in which all cultures can develop freely……Through international and intercultural friendship, young people should benefit from cultural diversity, through their actions today, they should help to preserve it for generations to come. Thus, while youth are the key to the future, it is essential that they shape the present too. (UNESCO, 2004, p.4)'

The same document stated that the key to stainable human development is the preservation and promotion of cultural diversity, which the market forces alone cannot guarantee (UNESCO, 2004). 'As a source of exchange and innovation, cultural diversity is as necessary for humankind as biodiversity is for nature.' (UNESCO, 2004, p. 6)'

This quotation could be expanded to say cultural diversity mean different customers for ecological, economic, and social development markets. Education for development can therefore take students cultural development into account. Vygotsky (1978) showed the relationship between learning and culture, According to him culture shapes ones' way of thinking and knowing. As such we can claim that all knowledge is situated in some culture and culture is needed to process knowledge.

MASLOW'S THEORY OF MOTIVATION AND EDUCATION FOR SUSTAINABLE DEVELOPMENT

Abraham Maslow developed the Hierarchy of Needs model in 1940-50's in USA, and the Hierarchy of Needs theory remains valid today for understanding human motivation, management training, and personal development. Indeed, Maslow's ideas surrounding the hierarchy of needs are today more relevant than ever. His work and ideas extend far beyond the hierarchy of needs. For example the concept of self-actualization relates directly to the present day challenges and true personal development for employees, by calling for development for life not just for work. The same applies to schools and universities, students need to be taught for life not just for work. The teaching should provide real meaning, purpose and true personal development for the students. The issues of sustainability as outlined in UNESCO literature such as equity, human rights, eradication of poverty, balance between economic activities and preservation of the eco system, issues of the right to good education or to exist in a society, lend themselves in Maslow's concepts of motivation and self actualization. It follows that sustainable success for students or workers, should start with individual development support pointing to a direction of self - actualization

In fact virtually all personal growth, whether in a hobby, a special talent or interest, or a new experience, produces new skills, attributes, behaviours and wisdom that is directly transferable to any sort of work roles As such sustainable success should start with offering development support to staff or students in any direction whatsoever that the person seeks to grow and become more fulfilled.

MASLOW'S SELF-ACTUALIZING AND STUDENT LEARNING EFFECTIVENES

According to Sullivan and Wilds (2001), 'no matter the wording, the most important purpose of an institution of higher education is to educate students' (p. 1). This suggests that the most important aspect of institutional effectiveness is student outcomes. Student achievement relative to the curriculum is of paramount importance to academic effectiveness. While achievement is in itself important, 'effectiveness dictates a broader scope in that it implies improvement in instruction, methodology, or technology based on the interpretation of data (Sullivan & Wilds, 2001, p. 1).' Accrediting agencies expects institutions to assess student outcomes and to make improvements to the curriculum based upon that data. Institutions must be able to document program improvements that have their roots in assessment data (Sullivan & Wilds, 2001). Maslow's concept of self actualization can be interpreted as student success as shown by outcomes. Research has shown that the higher the achievement the more evident that effective learning has occurred (Haan, 2007; Norden, 2006; Hoffmann, 2006 Hunsson and Norden, 2005; Losike-Sedimo, 2008).

LEARNING OUTCOMES AS CAPABILITIES FOR PARTICIPATION IN SUSTAINABLE DEVELOPMENT

According to Vygotsky learning is not development; however, properly organized learning results in mental development and sets in motion a variety of developmental processes that would be impossible without learning" (Losike-Sedimo,2004,Vygotsky, 1978). To fully enhance self-actualization and development as expressed by Maslow, education must move from rote learning towards specifically addressing the development needs and aspirations of the individuals, their ability to think and reason, build up self-respect, as well as respect for others, think ahead and plan their future. The importance of such mental power, cognitive, emotional and social abilities, is making its way into education policies and plans, often under the name of life skills. This term appeared early in the field of health promotion where it was recognized that people cannot achieve their fullest health potential unless they are able to take control of what determines their health (WHO, 1986). Life skills were seen as the abilities for adaptive and positive behaviour that enable individuals to deal effectively with the demands and challenges of everyday life.

In Maslow's development, human beings are placed at the centre of concerns for sustainable development. Sen put it this way, human development is a process of expanding the real freedoms that people enjoy, expressed as their capabilities (Sen, 1999). Using Maslow's approach, real poverty is identified not only as deprivation of income only, but also as deprivation of capability to avoid or deal with poverty. The role of education as regards the capability approach is multiple and complex. Being educated has been described by Sen as a basic capability (Sen 1992). Education is referred to as foundational to other capabilities as it provides a concrete set of basic learning outcomes, such as the abilities to read and write (Unterhalter, 2002). However, from the point of view of the capability approach, one can also argue that learning that stops at the level of providing only basic reading and writing skills would be insufficient to advance sustainable development and fighting development problems fully (Bakhshi *et al.* 2003, Bakhshi *et al.* 2004, Hoffmann *et al.*, 2005).

In order to truly expand the substantive freedom of people to live the life they value and to enhance their real choices, education needs to take into account the inter-relatedness of teaching, learning, and human development. Through education, children and adolescents need to be assisted in developing abilities that help them think critically and creatively, solve problems, make informed decisions, cope with and manage new situations, and communicate effectively. In other words, education contents, processes, and contexts must be of such quality that it leads to specific learning outcomes in the form of capabilities. Maslow's theory is in line with the convention of the rights of the child declaring that education of the child needs to be directed to development of the child's personality, talents and mental and physical abilities to their fullest potential (United Nations General Assembly, 1989). The increasing shift towards such learning outcomes is also found in international education commitments. The World Education Forum in 2000 took the position that education be geared to tapping and developing each individual's potential needs to emphasize the acquisition of skills (UNESCO, 2000*a*). The same ideals are echoed in the Dakar framework for action which gave a new impetus to the concept of quality in education. Included in its goals were recognized and measurable learning outcomes in literacy, numeracy as well as essential life skills. The latter are thought to be what ultimately positively shape agency, attitudes and behaviour, and have been proposed to be closely linked to capability (Bakhshi *et al.*, 2003, Bakhshi *et al.*, 2004, Hoffmann *et al.*, 2005).

CAPABILITY AS A LEARNING OUTCOME OF LIFE SKILLS EDUCATION

The Report to UNESCO of the International Commission on Education for the Twenty-first Century (Delors *et al.*, 1996), stressed the importance of enhancing "inner capacities" in order to meet the challenges of education. It proposed a framework for teaching, learning and human development consisting of four pillars of learning. Namely;

- Learning to know - the understanding and use of knowledge. Related abilities include critical thinking, problem solving and decision-making life skills which are fundamental to informed action.
- Learning to be concerns the concept of agency. Related abilities include life skills for coping, self-awareness, esteem, and confidence, aiming at building an identity, valuing oneself, setting goals, etc.
- Learning to live together implies feeling affiliated to a group, a category, a society and a culture, and understanding and respecting differences. Related inter-personal abilities include communication, negotiation and refusal life skills etc. essential to define a person as a social being, in constant interaction with the world.
- Learning to do is linked to the mastering of cultural tools, i.e. objects or patterns of behaviour, in order to act. The related abilities are linked to the practical application of what is learned, and need to be associated with life skills in a teaching learning situation.

(UNESCO, 1996)

Capability as a learning outcome can simply be termed as acquired functioning or high quality learning outcomes. This view explains what Maslow terms self-actualization. This is supported by a variety of educational, behavioural and developmental theories. For example; the reality for each person is defined by him or herself and seeing oneself as the main actor in defining a positive outcome, Bandura, 1977, Vygotsky, 1978). The first three pillars of learning, express the ideals of sustainable development by educational outcomes that help students to understand themselves and future challenges. While the learning to do is linked to what actions a person takes; it is learning skills for immediate needs and day to day functioning. It also represents an achievement linked to "refined" functionings. These functionings should also secure the learner a specific future. Hence life skill education should produce fully functioning citizens.

LIFE SKILLS AS THE BASIS FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT

Life skills can be closely linked to the notion of capability, and has also been proposed as being part of the underlying principles for education for sustainable development (Hoffmann *et al.*, 2005). The notions of the capability approach and of life skills are also being expressed in new global and regional strategies. The United Nations Economic Commission for Europe (UNECE) Strategy for Education for Sustainable Development (ESD), expresses the vision that ESD should 'equip people with knowledge of and skills in sustainable development, making them more competent and confident and increasing their opportunities for acting for a healthy and productive life in harmony with nature and with concern for social values, gender equity and cultural diversity' (United Nations, 2005).

Education for sustainable human development must be an education that aims to help people of all ages better understand the world in which they live, and better act on this understanding. It needs to address the complexity and interconnectedness of problems such as poverty, consumption, environmental degradation, health and population issues including HIV/AIDS, conflict and violation of human rights, etc. It needs to address these topics not only by providing information, but also the abilities needed to understand and use this information, to establish agency and attitudes supporting behaviour that leads to sustainable development (UNESCO, 2005, United Nations, 2005). For instance Botswana as a country that relies on beef industry, wild life tourism and diamond mining for its economy, she needs to equip the students with capabilities to deal with the realities of economic development in harmony with nature. The students need capabilities to understand and act upon; sustainable development in terms of: consumption, environmental degradation, and health and population issue, HIV/AIDS ,poverty, conflict, violation of rights, equity, culture diversity etc. The miners should have the capacity to mine and conserve the environment as well as preserve minerals for coming generations. As well as the ability to transfer skills and adapt to new environmental changes as in when the diamonds are finished. The cattle and tourism industry have to make profit

while preserving both wild and domestic animals for future generations. Both mining and animal industry should guard against overdeveloping the land. All activities should respect the culture of the people. For all that to happen, ESD must be a capability/life skill building process. It must be a means to fulfilling/self-actualization process with products that are fully functioning in the society and are partners in sustainable development

IMPACT OF THE CAPABILITY APPROACH ON EDUCATION POLICIES

An education which addresses the needs of the present generation while building the skills of future generations can be considered sustainable in its approach and in line with the concept of sustainable development. However, it needs to be driven and coordinated by national policy. A shift towards sustainable human development, including the notions of the capability approach is already influencing national education policies. As a follow-up to the World Education Forum in 2000, a number of countries have developed national Education For All (EFA) action plans integrating skill or capacity building. In a UNESCO survey of EFA National Action Plans, 75 countries out of 78 countries reported having included life skills. For example in the SADEC region Botswana, South Africa, Zambia, Namibia, Lesotho have integrated capacity building in the education policy and plans (Hoffmann, 2006) Botswana, and other members in the whole region, their integration is HIV/Aids driven (Botswana Ministry of education, 1998).

RESEARCH DESIGN

The study used both qualitative and quantitative techniques. This design offers opportunities to study phenomena in its natural setting (Creswell, 2004, Jankie, 2001; Dyer, 1999; Bogdan & Biklen, 1998; Denzin and Lincoln, 1998). In this study cultural practices were studied in their naturally occurring social contexts. The researchers described the experiences of the participants guided by theories of child development domains. They made observations conducted interviews and analysed student's achievement records. The research team engaged ethnographic techniques of data collection to describe and interpret the complexities and multiple meanings of observed cultural activities. These cultural activities were studied at home and at school contexts. Ethnographic techniques allowed us to make detailed descriptions of particular social contexts, documented and analysed them as a means of understanding a group's culture. (Denzin & Lincoln, 1998; Spradley, 1979). The study adopted the interpretive perspective of ethnography by providing rich descriptions of studied aspects of culture. Student achievement score were analysed and summarized using SPSS.

Population and Sample Selection

Children aged between 15 and 19 years in Botswana secondary schools formed the population. Purposive sampling was used by selecting individuals and settings that best suites the goals of the study. For example language was used as a variable for culture diversity. Twenty languages were identified and villages that used those languages were selected.

Participants

The participants were selected children from all corners of Botswana aged 15-19years. A total of 350 children falling under different ages, grades were observed, interviewed, and studied using other forms of data collection methods, such as documents, meetings with teachers and parents, interviews with peers and focus group method. Specific demographics of the children were summarized in a table. For lack of space it is not included here but relevant information is included in discussions.

Research Questions

1. What is Botswana culture?

2. What aspects of children's daily functioning are a portrayal of culture?
3. How does culture facilitate the processes of cognition and learning?
4. What are the influences that can benefit education for sustainable development and other aspects of human development?

Instrumentation

Self reports, Interview guides and non participant observation guidelines, document analysis sheets, Focus group scripts (open ended questionnaires for teachers and family or parental, peers meetings), video and digital recorders.

Procedure

Prior to the commencement of the study the team settled issues of permission, gaining access, informed consent and the use of human subjects. The study commenced during the winter break 0f 2006 and continued through the fall term of 2008. The team members and tasks were specified for studying cultural activities linked to cognitive development. The emphasis was on describing aspects of Setswana culture that influence cognition and learning within nested structures of Botswana's social and physical environments of school and home. For example, observing culturally accepted behaviours, the intellectual steps needed to exhibit those behaviours, how those behaviours were rewarded, and imitation of correct behaviours during social interactions, doing a task analysis to identify the steps a child goes through to exhibit behaviour social and communication skills. The team recorded both verbal, non verbal communication and observable behaviours on video and digital recorders. In the evening members sat in a conference to reflect closely, analyse; and correct notes as they viewed and listened to tapes and watched videos.

Analysis

Data analysis started on the onset of field work. There was a continuum between data collection, data description, and data interpretation (Kvale, 1996). As data were analysed avenues for identifying any gaps in the data lead to further inquiry and improvement of the interview guide. Quantitative data was analysed alongside qualitative one.

RESULTS AND DICUSSION

In this study, lack of motivation and sustainability of good learning, retention rate of students was associated with the learning culture clashing with those of the students, the teachers, the curriculum, and the school. The majority of the students whose culture varied from the mainstream culture did not learn as much and achieve as much as those whose culture is included in the school curriculum and teaching methods. The same children did not see the worth of education other than meeting friends and provision of good lunch every day. The following section presents the results for each research question These finding are related very well with the value and role of culture as stated in the in Bakhshi *et al.* 2003, Bakhshi *et al.* 2004, Hoffmann *et al.*, 2005 that states, in order to fully expand the substantive freedom of people to live the life they value and to enhance their real choices, education needs to take into account the inter-relatedness of teaching, learning, and human development

What is Botswana Culture?

Botswana is a landlocked country in southern Africa. It shares borders with Republic of South Africa (RSA) in the south and east, Zimbabwe and Zambia in the north, and Namibia in the west. It is approximately 581730 square kilometres in area (Botswana Official Handbook, 1985). The researchers travelled 1125 kilometres from the extreme south to the extreme north and 970 kilometres across the widest part. The people are called Batswana and the national language is called Setswana.

The researchers expectations were that as a country Botswana will have a culture. The following findings revealed otherwise.

Demographic Background

Botswana is inhabited by people of predominantly Tswana origin whose history is traced back to the 14th century at a place now known as Magalisberg Mountains in Transvaal. (RSA). Besides the Tswana group there are many ethnic groups that constitute an important section of the population. In relation to the Tswana group, they are the minority but important in terms of culture diversity. Among these groups are Bakalaka who speak Ikalanga, the language is closely related to shona languages of Karanga, zezuru, and shankwe. Other minority groups were Bayei, Bambukushu, Basubiya, these tribes were said to originate from Central Africa, and occupy land around the Delta panhandle and their culture have been affected by the proximity to Angola. In this area the researchers used an interpreter. There were also Baherero, who are in three groups, Basarwa who had 13 groups/dialects, Bakgalagadi who had 5 groups, Bazezuru, Basweu, (All people of European origin) occupied the remote west next to the desert, Baindia (Indian origin), Babirwa, Batswapong, Bakoba and a group that called itself the river people are among the minority. The minority groups have kept their cultures through centuries and are important contributors to mainstream Setswana culture.

Characteristics of Setswana Culture

Botswana is a multicultural country, with many regions that are less exposed to the culture of the majority ethnic groups. Setswana can be read, written and spoken by both the minority and the majority groups, but it is a second or third language to some nationals leaving in remote areas away from the capital city Gaborone. Besides multilingualism, peace, harmony, tribal and racial tolerance all encompassed in Setswana words, KAGISANO, BOTHO which has no English equivalent, literally meaning being human, peace, harmony, democracy and tendencies for collective identity, collective survival, respect for leaders, and self reliance perpetuated by social transmission of traditional knowledge and skills. Even though different regions display unique cultures, these characteristics run through the country.

What aspects of children's' daily functioning are a portrayal of culture?

A typical day of secondary school students starts with chores in the home which ends with living for school. These chores are cultural. They are determined by the age and developmental stage of the child. At school there are two areas where culture manifests itself. Students process subject matter by first translating it to their languages and applying concepts to the lives. In sports and break time they play cultural games and communicate in their mother tongue. The school also serves traditional food. The students experience conflict between their social roles, goals and education tasks and goals. The school structures and environment presents the academic world within the context of a foreign culture. Even subjects where there is natural leeway for cultural inclusion such as language lessons, History lessons and social studies, teachers still miss those opportunities by strictly adhering to the culture of the textbook. Even the classroom communication lacks the basic courtesy that comes with the natural social interactions of the home settings. When the students get home at the end of school day they have to change into who they are culturally. According the students self reports this conflict interferes with their studies and self concepts. Students become demotivated and frustrated by the difference in the way they learn at home and the way they learn at school.

How does culture facilitate the processes of cognition and learning?

Theoretically cultural experiences should be a stepping stone for information processing and learning in the classroom. What we observed was the opposite of what we learned from literature reviews and theory (Piaget, 1952; Vygotsky, 1978; DeVries, 1997; Gaskins1999, Losike-Sedimo, 2004, Berk, 2004; Losike –Sedimo 2007). Instead the students' cultural experiences were hindrances. For example

just cultural identity itself spelled social inequalities. Certain tribes who were inherently poor, who were demotivated, were labelled as not caring for education as they were hunters, gatherers, and fisher boys and girls. The school subjects deskilled and delearned students' cultural knowledge and replaced them with foreign ones. Students reported hating certain subjects and teachers because they could not relate with what was taught. Teacher's interviews, meetings, and focus group discussion revealed that teachers are aware of the culture clashes and exclusions but they did not know how to correct that what is wrong. At home the parents complained about the changes that come with education. Their children were losing good manners and the concept of BOTHO.

What are the influences that can benefit education for sustainable development and other aspects of human development?

There was impressive community participation in schools. Some schools were built by local communities as village projects. There was excellent membership for PTA. Members of the community were engaged in cooking traditional meals for the students. Educators can benefit more by engaging local communities to inject culture in their subject teaching. Not just in subjects like art and craft but every subject can be contextualized professionally to meet the expectations of the students and the community they live in. (Wiest, 2002). In classes where the students' culture and ways of knowing were incorporated, there was higher motivation to learn and higher achievement. This was in line with previous research in the country (Chilisa, 1987; Arthur1998; Jankie, 2001; Losike-Sedimo2008) It seemed there was a ripple effect. Children doing well at school had wide and strong support at home. Families looked upon their succeeding children as their hope for the future. Looking at the workforce, it appears the same pattern of who gets ahead is that those who made it in education became more employable and more mobile on the social and economic ladder. The schools could rethink issues of access, equity, and multiculturalism by building on the positive ripple effect of culture and learning stated above, by creating a strong involvement of all students' parents in the education of their children

SUMMARY AND CONCLUSION

Engaging the Community in the Transference of Life Skills/Capacity for Effective Learning

While private and rich schools in the country are struggling with problems of drugs, alcohol and substance abuse, the majority of public secondary students are grappling with different kinds of social problems rooted in the conflict of who they are at home and at school. There was a contradiction existing between who the student is at home and in the street and who the student becomes at school. This resulted in student confusion, low motivation and low achievement.

The Report to UNESCO of the International Commission on Education for the Twenty-first Century (Delors *et al.*, 1996), stressed the importance of enhancing "inner capacities" in order to meet the challenges of education. That implies learning that is linked to the mastering of cultural tools, i.e. objects or patterns of behaviour, in order to function in ones' society. Research on incorporating students' ways of learning in teaching methods observed that student motivation, achievement, and attitude improved with the incorporation of their culture in teaching methods. (Ginter, Brown, Scalies and Ripley, 1989; Drysdal, 1997; Yoder, 1994) Students cultural knowledge is described by (Vygotsky, 1978) as consisting of unique ways of knowing, or acquiring information and therefore a necessary tool for learning (Newman, 2006). To exclude the student culture, is to de-learn, de-skill, and degrade, and kill their self-worth. (Gadotti, 2008, Haan, 2007, Higgitt, Haigh and Chalkley, 2005, Freire, 1992, 1997, Vygotsky, 1978). According to Maslow's theory these effects are a road map to lack of motivation and self-actualization. Research in Botswana has shown that affected students never make it to the top (Chlisa, 1987 Bigale and Monau, 1995, Kann and Mapolelo, 1989, Nyathi – Ramhobo, 1990, Arthur, 1998, Losike-sedimo, 1996, 2007, 2008. As a way of helping the teachers to deal with cultural barriers university can engage the community in its teacher training to inject the

transfer of life skills in the programs. After training the teacher would have the know how for involving the community. Reviewed literature revealed success and advantages of community involvement. The involvement of the community can take the route of education for sustainable development, first by building student worth and enhancing self-actualization and second by using local communities to reconcile the school learning culture with the societal culture. Such efforts would encourage complete function of the student, which will afford her or him participation in education for sustainable development (Hoffman, 2006; Mtsuura, 2004). Sustainability itself should start with effective learning judged by students' success or outcomes (Sullivan & Wilds, 2001).

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Exploring the Use of Mathematics Manipulative Materials: Is It What We Think It Is?

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ABSTRACT

The use of mathematics manipulative materials such as counters and Base Ten Blocks is common in many Australian classrooms. Seemingly there is an unchallenged assumption that the use of manipulative materials in the teaching of mathematics is a key to learning about mathematics concepts, and this is supported by the mathematics manipulatives industry. Teachers who are time poor and under pressure are either looking for a miracle manipulative to solve all their problems with teaching a particular topic such as fractions, or have abandoned the use of manipulatives in favour of textbooks.

This paper reports on a survey and follow-up interviews designed to explore key issues in the use of mathematics manipulative materials in the teaching of mathematics. It also reports on the collaboration between Edith Cowan University, the Independent School sector in Western Australia and R.I.C. Publications, an international publisher and supplier of mathematics manipulative materials based in Western Australia. The aim was to look into the state of play of the use of mathematics manipulative materials in primary schools in Western Australia. To this end, a survey was sent to all teachers in primary and designated middle schools in Western Australia (Pre-Primary to Year Ten; ages 4 – 14), providing us with an initial insight into their use. Further evidence based on a comprehensive literature review, school visits, interviews and teacher workshops is used to review the current state of play as to the use of mathematics manipulative materials in classrooms and to respond to issues raised in the surveys and interviews. This paper compares the data obtained from the survey and interviews.

INTRODUCTION

In the sixties, the use of mathematics manipulatives was often justified on the basis of the ancient proverb:

I hear and I forget
I see and I remember
I do and I understand.

This proverb is still being used as a justification for the use of mathematics manipulatives. While this proverb has a ring of truth to it, given that the use of mathematics manipulatives is encouraged in the teaching of mathematics, particularly in the early years, research evidence is required to indicate whether the use of mathematics manipulatives is effective and if so, under what conditions. Similarly, if mathematics manipulatives are not effective, why is this the case and can adjustments be made to improve the situation or should the use of mathematics manipulatives be discouraged in some cases?

The following quote from Ball (1992) resonated with the researchers:

> Whether termed manipulatives, concrete materials, or concrete objects, physical materials are widely touted as crucial to the improvement of mathematics learning (p. 16).

In their experience and from their observations of teachers, the researchers believe that teachers of children aged 5 – 11 and especially those aged 5 – 8 in Western Australia use mathematics manipulatives without questioning the appropriateness or value of the manipulative being used. There tends to be a belief that mathematics manipulatives are inherently good and that lessons that make use of mathematics manipulatives are pedagogically sound.

The researchers set out to gather evidence as to the use of mathematics manipulatives in Western Australian schools and the reasons teachers were choosing to use mathematics manipulatives or not. A comprehensive survey (see Appendix) was sent to all primary and middle schools in Western Australia and teachers in these schools were invited to respond to a series of items. A limitation of survey methodology is the quality of responses in relation to 'depth' of meaning (McMurray, Pace & Scott, 2004). Therefore follow up interviews were conducted in order to verify data collected via the survey and to probe further as to the reasons behind the answers that were provided. At the same time a comprehensive literature review was conducted so that comparisons to previous research could be made.

The initial results of the survey have been reported elsewhere (Marshall & Swan, 2007; Swan, Marshall & White, 2007; Swan, Marshall, de Jong, Mildenhall & White, 2007). In this paper selected aspects of the survey data will be reported in a more comprehensive fashion and insights gained from the interviews will be linked with the survey data to provide a richer picture of the use of mathematics manipulatives in Western Australian primary and middle schools. To better understand the data, a comprehensive literature review was undertaken. Prior to reporting the data a brief overview of the literature is provided to offer a context for the report that follows.

REVIEW OF THE LITERATURE

Uttal, Scudder and DeLoache (1997) noted that the literature is somewhat ambivalent about the use of mathematics manipulatives. They explained that, 'research on the effectiveness of manipulatives has failed to demonstrate a clear consistent advantage for manipulatives over more traditional methods of instruction' (p. 38). When probing deeper it appears that this statement was made in the light of studies that focus on the acquisition of traditional arithmetic skills such as using algorithms to add three-digit numbers. While the use of manipulatives such as Multibase Arithmetic Blocks (MAB) have often been linked to the development of algorithmic arithmetical skills, as the name suggests, the authors were more interested in the ways that manipulatives can promote thinking on the part of the students using them. Ineffectual use of manipulatives is often linked with the use of mathematics manipulatives as a demonstration tool. This is often the case with the use of MAB where students are taught to copy a particular procedure using the blocks in order to reach a specific goal such as the development of an algorithm for three-digit addition. The advent of Interactive Whiteboards has focussed further attention on whether mathematics manipulatives are used as a demonstration piece or as an explorative tool.

Prior to the advent of Interactive Whiteboards, Sowell (1989) performed a meta-analysis of much of the literature on the use of mathematics manipulatives to that time. The results indicated that short-term use of mathematics manipulatives was not effective and that long-term use was more effective. A critical factor, however, is the teacher. Teachers who lack conviction as to the efficacy of the use of mathematics manipulatives will be less likely to persevere with their use, and implement systems for their distribution and collection. Committed teachers still require training in how to make effective use of specific mathematics manipulatives.

The literature often refers to the use of mathematics manipulatives or concrete materials as creating a bridge from the 'concrete to the abstract' (Heddens, 1986). The issue of transferability of knowledge is an issue that causes debate in the literature. For example, does the manipulating of MAB improve a student's understanding of place value, and if so does this impact on the development of the traditional paper and pencil algorithms? (Howden, 1986). The debate in the literature tends to focus on the acquisition of traditional skills rather than the development of mathematical thinking. The teacher appears to play the key role in choosing appropriate mathematics manipulatives, sequencing their use in a particular way and structuring the learning experience. It should also be noted that the use of mathematics manipulatives should not be seen purely as a means to an end, that is the development of traditional arithmetic skills, but really as a catalyst for deepening mathematical understanding. In order to achieve this, the skilful teacher will need to encourage the students to talk about, discuss and explain their understandings gleaned from 'playing' with the mathematical manipulative. Language is the main tool in helping to make the bridge from the 'concrete to the abstract'.

This brief overview of the literature on the effectiveness of using mathematical manipulatives in the teaching of mathematics has indicated that teachers play a key role in structuring when and how mathematics manipulatives are used to support learning. Teachers' pedagogical content knowledge and profound knowledge of the particular concept come into play (Ma, 1999; Shulman, 1986, 1987). Teachers need to have a deep understanding of the mathematics they plan to teach; they need to know how the particular mathematics manipulative may be used to support the development of a specific mathematics concept; they need to know the learner and they need to be able to manage the learning environment (for example collection and distribution of materials) in order to be effective teachers of mathematics.

To gain a better understanding of how teachers use mathematics manipulatives, a survey and follow up interviews were conducted. Prior to creating the survey, the literature review was performed to examine whether previous surveys of manipulative use had been carried out and what the findings suggested.

SURVEYS OF THE USE OF MATHEMATICS MANIPULATIVES

Five previous examples of surveys being used to gather data on the use of mathematics manipulatives were found. Three Australian studies were carried out in primary and secondary schools in New South Wales. Howard, Perry and Lindsey (1996) presented some initial baseline data on the use of manipulatives in secondary school mathematics classrooms; Howard, Perry and Tracey (1997) compared primary and secondary school teachers' views on the use of mathematics manipulatives; and Howard, Perry, and Conroy, (1995) looked at the use of concrete material in Years K to 6. Hatfield (1994) surveyed the use of manipulative devices in elementary schools (K – 6) in Arizona; and Gilbert and Bush (1988) studied the familiarity, availability, and use of manipulative devices in mathematics at the primary level across twenty-one states in the USA. The results from these studies will be compared with the data collected in our survey.

Prior to sharing the results from the survey and follow up interviews, the researchers wish to set the context or framework chosen to support the research. A brief explanation of the construction of the survey follows along with the reasons behind the choice of questions.

RESEARCH FRAMEWORK

One goal of this study was to determine the state and nature of the use of mathematics manipulatives in Western Australian primary and middle schools. (In Western Australia, primary school students range from ages 4 to 12; designated middle schools' students are from ages 10 to 14). The researchers wanted to find out what, where (year levels) and how manipulatives were being used, and teachers' perceptions of their efficacy in enhancing the learning of mathematics. The survey gave the

opportunity for the researchers to gain a broad impression of the issues associated with manipulative use, and enabled the researchers to compare the data with previously published survey data.

The representative and descriptive character of the data that was being collected necessitated the creation of a descriptive survey. This form of survey 'aims to estimate as precisely as possible the nature of existing conditions' (Burns, 1997, p. 467), and 'describe some sample in terms of simple proportions and percentages of people who respond in this way or that to different questions' (Punch, 1998, p. 78). Some of the data collected were quantitative, where the state of the application of mathematics manipulatives was determined by calculating simple proportions and percentages of items such as the frequency with which a particular manipulative is used across the full range of year levels being studied. Qualitative data took the form of identifying the views and opinions of teachers on conditions such as hindrances, and advantages and disadvantages of using mathematics manipulatives in the classroom. Interviews were used to clarify some of these responses.

The descriptive survey questionnaire was designed with three considerations: Firstly, a representative sample across a large and diverse number of WA primary and middle schools was required. Many of these schools were located in regional and remote areas and were thus inaccessible to the researchers. Secondly, in view of the potentially large sample, the survey offered the most efficient and cost effective method of gathering data. Thirdly, to enhance reliability and validity of the study, a structured instrument was required to maximise standardisation of responses.

These considerations were countered by typical disadvantages of using a descriptive survey questionnaire. Although the number of returns was exceptional, with returns from 820 teachers in 250 schools, and therefore reflective of a legitimate representative sample, the qualitative data elicited by the questionnaire did not offer enough depth to explore more complex issues associated with, for instance, respondents' reasons for choosing particular mathematics manipulatives to use in their classrooms. Interview data was required in order to corroborate and explore the evidence collected via the survey instrument. Interviewees were selected from teachers who had indicated their willingness to participate in this stage of the research, and the selections were made to get as wide a range as possible of year levels taught, number of years of teaching, and urban, rural or remote locations. Comparisons were made to the literature; in particular previous data collected via survey research.

The resultant data set was huge, much larger than the researchers had imagined. In this paper the researchers will report on questions 11 – 13, which deal with issues related to teachers' beliefs about the use of mathematics manipulatives. Discussion of earlier findings may be found in Marshall & Swan, 2007; Swan, Marshall & White, 2007; and Swan, Marshall, de Jong, Mildenhall & White, 2007. These particular questions probed perceived advantages and disadvantages of manipulative use and hindrances to their use. Overall, the responses indicate how important the teacher is to the effective use of mathematics manipulatives in the classroom

RESULTS

The results are reported question by question. In each case the question is provided and simple numerical data is provided. Support data gleaned from written comments made on the survey document and verbal comments made during the follow up interviews are then provided. These comments help to illuminate what the teachers meant when responding to the questions. Questions are open to interpretation and as such the written and verbal responses help to clarify the data and add richness to the research.

Question 11: What are the main advantages of using manipulatives in the classroom?

Question 11 asked teachers to comment on what they perceived to be the main advantages of using manipulatives in the classroom. Most participants described more than one advantage, and responses were grouped, where possible, into a number of categories. The most common comment, from 155

participants, centred on manipulatives being a visual aid, or that they assisted in concrete visualisation. The next most common comment, from 135 participants, was that they provided hands-on learning, followed by building better understanding (from 126 participants). Many teachers felt that the use of manipulatives helped to engage students, or provided them with enjoyment or were 'fun' (from 120 participants). On a similar vein were the comments that they heighten interest or provide motivation (71 participants).

There were many comments on how the use of manipulatives can help children to grasp concepts or reinforce them (61 participants); how they can be used to introduce concepts (36); that they help the abstract become concrete, and that it is easier to go from the concrete to the abstract (33). Many comments were made on advantages other than those that were directly mathematical. These included that the use of manipulatives appealed to all styles of learning (48 participants); encouraged oral language (23); improved children's fine motor skills (12); provided opportunities for collaborative learning to occur (9); addressed multiple intelligences (6), and all learning abilities (4); and allowed for peer tutoring (4).

From a teacher's perspective, 27 participants commented that the teacher can more easily note what the child is 'thinking' through the use of manipulatives. Skemp (1986) makes exactly this point in the video 'Twice Five Plus the Wings of a Bird', when he said that the child's thinking is right there on the table before you. *'They enable a teacher to see what the children are thinking, especially when they are unable to articulate themselves.'*

There were some inherent warnings included in the comments on the advantages of the use of manipulatives. One teacher made the point that 'The students sometimes misunderstand the point of the lesson if it is always explained using the same manipulatives'; another that, 'Sometimes kids will pick up a 'wrong' concept from a manipulative so their use needs guidance and supervision and follow-up, then builds better understanding and concepts'. One telling comment was, 'I would use them more often but budget constraints limit access'.

One teacher succinctly made this point, 'All children need to learn mathematics with manipulatives. A lot of children need concrete materials to aid in all maths activities for some time. As they become more adept in mental strategies they are able to dispose with the concrete materials. They are essential to all mathematical learning'. Even more succinct was the comment, 'Ask Piaget'!

Question 12: What are the main disadvantages of using manipulatives in the classroom

Question 12 asked teachers to comment on what they perceived to be the main disadvantages of using manipulatives in the classroom. Many of the responses were mirrored in the list of possible impediments that were provided in question 13 that followed. In that question, which appeared on a later page, teachers were asked to rank from 1 – 13 the possible hindrances to using manipulatives in the classroom. However, this earlier question was included to find out what teachers perceived as the disadvantages to the use of manipulatives, even given that may still not preclude their use.

The highest ranked disadvantage, from 164 participants, was that teachers often do not have enough of the equipment to go around. This is in addition to the comment from a further 45 participants who maintained that they had a problem having the materials ready to use, with easy access, particularly when sharing with other teachers. There were an additional 50 participants who made the point that the cost of manipulatives made their use problematic.

The overall second highest disadvantage was given as children fiddling and not listening to instructions – that they were often a distraction (94 participants). On a similar vein to this, the amount of noise generated with their use was named by 50 participants; behaviour management was mentioned by a further 44 participants; messiness by 20 participants and equipment misuse by 4 participants.

The third disadvantage, with 90 teachers making mention, was storage and organisation of the materials. Another 82 participants discussed the issue of setting up and packing away, with 49 participants commenting on problems with items getting lost, mixed up or damaged; a further 11 participants wrote of not having enough space in the classroom to use them well; and 4 who made mention of the need to audit materials.

Another area of significance was that of time (64 participants); both in having enough time to teach using manipulatives, and time to organise, set up and pack them away. One teacher elaborated on the time issue and storage of materials, saying, 'Time to initially organise the materials [is a disadvantage] but if that's done at the start of the year/ materials stored efficiently it's OK. We had large plastic tubs with basic kit of Attribute/Pattern blocks, geoshapes, 4 types of toy counters, double-sided counters, slides for each class, 1 – 3'. The invitation was then extended to visit the school to view their storeroom organisation.

The final significant category of responses was that of the issue of 'play'. Thirteen participants made comments similar to the following, that manipulatives 'Can be used for 'play' without proper instruction or process being explored. They require teaching, but can be seen as toys'. Or that it was sometimes hard to wean children off reliance on them (11 participants).

There were many other comments that were interesting: 'Hygiene issues – keeping pieces clean'; 'Safety – putting pieces in mouth'; 'Boys – need I say more'; and conversely, 'Can be hard to get girls interested'; 'We need proof/evidence on paper of the children's learning for parents to see'; and 'Can confuse children if not used properly e.g. place value; MAB cube = 600'.

It was comforting to note that 50 participants wrote 'None' as their response to this survey question, with a number of other participants leaving this section blank. Two final similar comments were: 'Nil at Year 2 level' and a middle primary teacher who said, 'I can't see any [disadvantages] except for people with tidy rooms and low budgets'.

Question 13: Impediments to using manipulatives in the classroom.

Teachers were given a list of 13 possible impediments to the use of manipulatives in their classroom. This list was drawn from the literature (Gilbert & Bush, 1988, Howard et al., 1996; Howard et al., 1997; Hartshorn & Boren, 1990) and from incidental discussions with teachers. By far the four most common impediments were (1) money, (2) behaviour (classroom management), (3) organisation of materials (borrowing/returning, sorting, missing pieces) and (4) space (physical) to use in the classroom. By comparison, Gilbert and Bush (1988) found the main factors hindering increased classroom use of manipulatives to be (1) availability of materials and (2) lack of time. It is unclear whether the availability of materials was in terms of ease of accessing the materials, similar to this study's point (3) or if they were not in the school at all, which may be similar to this study's first point about lack of money.

Teachers in the Hatfield (1994) study were asked to list factors to consider when using manipulatives. What is interesting is that classroom control and management of manipulatives were listed. This is similar to the current research findings. It should be noted that in the current survey teachers were asked to rank hindrances and were given a list to choose from, so the two questions are not exactly the same.

Nevertheless the responses from the Hatfield survey were of interest to the research group. What is of particular interest, however, is that availability of manipulatives and teacher competence in using the manipulatives were listed as Hatfield's top two factors.

Question 14: Teacher Direction or Self-Discovery

Question 14 asked, 'When using manipulatives, will the students' experience be based on (1) Teacher direction or (2) Questions arising from self-discovery?" Of the teachers who completed this question, the majority of participants (397 teachers, or 71%) either ticked both boxes or wrote 'both' alongside the question.

Participants were then offered the opportunity to elaborate on their response. Most comments were similar to either 'Both are important, depending on the task' or 'Both – initially it may be teacher directed, but then we move on to self discovery'.

Of those who ticked only the Self Discovery box, comments included, 'We work in collaborative learning teams and many questions arise from the students' discovery activities' and 'For example, Oh look; if I join mine with ----- then we will have ----'.

Comments from the Teacher Direction teachers included, 'I find the students do not engage in 'self-discovery'. They are very dependent on the teacher direction even though I encourage self discovery', 'They don't 'discover' without direction, they throw things or build towers – nothing to with lesson outcome' and 'Due to availability and time constraints the time available does not allow for much self discovery'.

IMPLICATIONS

Manipulative materials are found in every primary school, albeit often in storerooms rather than in classrooms or better still in the hands of children. It is clear from the survey results that teachers believe that the use of mathematics manipulatives enhances children's learning of mathematics. It also appears that while this belief is held by over 95% of respondents, Pre-primary to Year two teachers make more use of manipulatives than teachers of older children. It is possible that textbooks play a larger role in mathematics lessons as they move from junior to middle to upper primary and lower secondary school and therefore less use of manipulatives is made. It is also appears that there is a belief by some teachers that the use of manipulatives takes too much time, particularly in upper grades where they make mention of a crowded curriculum. Another possibility is that the introduction of formal National testing (paper and pencil multiple-choice tests with no manipulatives allowed) impacts on teachers' use of manipulatives.

Survey data can disguise the real reasons behind a particular response. For example, the researchers were surprised that money was listed as the major hindrance to use manipulative materials to teach mathematics. However, recent changes to Kindergartens in Western Australia have meant that Kindergarten budgets have been reduced. Kindergarten teachers have therefore felt financial pressure for the first time, and therefore this may have been in mind when completing the survey.

Organisation of manipulatives is certainly an issue for many teachers who made comments on the survey about issues of borrowing and returning materials. It appears that in some schools the borrowing of mathematics manipulatives comes under the auspices of the library. In some cases not only is the tub of Pattern Blocks accessioned but also individual blocks are numbered. One teacher reported a school edict that any lost pieces would have to be paid for by the teacher who lost them. While the researchers were unable to test the veracity of this statement, it is understandable that if such a claim were true, teachers in that school would be reluctant to make use of manipulatives. Visits to school mathematics storerooms by the researchers would suggest that many manipulatives are in disarray, not labelled or worse still mislabelled, with pieces missing or in disrepair. There were also many examples of different sets of the same manipulatives in the storerooms, which in many instances were incompatible. It also appears that while some schools keep an up to date inventory, in others there is no record of purchases or where the manipulatives are stored. The researchers plan to collect further data on this issue because clearly while this issue is hindering the effective use of manipulatives, it is one that could be fixed with minimal effort.

A surprising finding was that despite believing manipulatives enhance children's learning, less than ten percent indicated they had engaged in professional development and only 19% indicated they would like further training in the use of manipulatives. This was considerably less than the 66% in a previous study, which indicated that teachers would like further training in the use of manipulatives (Howard et al., 1997). The previous study was carried out over ten years ago and it is possible that teachers are less likely to engage in professional development as a result of increasing pressures and general dissatisfaction with the state of the profession in Western Australia. In Western Australia a systemic mathematics professional development initiative involving eighteen hours of professional development has tended to 'swamp' teachers and fatigue them. Of particular interest is that this initiative appears to have had little impact on survey responses. Rather, one particular supportive manipulatives supplier seems to have had more impact.

What was of particular interest is the high proportion of K – 2 teachers who completed the survey and also the number of teachers who had been teaching for 15 years or more who took time to complete the survey. Data from this survey and others (Gilbert & Bush, 1988) suggest that the use of manipulatives reduces as grade level increases. It would make sense, therefore, that teachers in the Kindergarten to Year two range would show more interest in manipulatives.

LIMITATIONS

There are several limitations to this research. While the response rate to the survey in terms of the number of school and the number of teachers responding was excellent, the survey was sent only to Western Australian schools. The sample was therefore restricted to one state of Australia that at the time was undergoing curriculum upheavals. These pressures would have been foremost in mind when the surveys arrived, as teachers would have been writing end of year student reports. It was interesting to note that not only did K – 2 teachers make most responses, but they also made far more written clarifications outlining the reasons why they made particular choices. Typical written responses from teachers of upper primary and secondary classes were short or non-existent. This meant that not only were more surveys completed by teachers of K – 2 children, but also these teachers gave far more written clarification of comments and therefore the data may be skewed by these teachers.

The researchers were also aware that teachers receive many surveys. Several Principals phoned to say that teachers regularly receive surveys, most of which end up in the bin. On the whole these Principals were supportive of the research but felt that teachers were suffering from 'survey fatigue'. The researchers were also aware that some teachers might quickly tick a few boxes or sometimes simply write what they think the researchers might like to read and therefore focus groups, teacher interviews and group interviews were also carried out to verify what the survey data suggested.

CONCLUSION

While the research is still in its infancy the data collected from the survey has started to paint a picture of manipulative use in the teaching of mathematics in primary and middle years classrooms. Previous research by Gilbert and Bush (1988) suggested that manipulative use reduces as grade level increases. The data from our survey would appear to confirm that finding. Reasons for this reduction in manipulative use may relate to increased use of textbooks, a view that using manipulatives is 'babyish', or a lack of awareness of how manipulatives may be used to develop mathematics concepts with older children. Another possible reason for this reduction may be the impact of State and National testing in Years 3, 5, 7 and 9.

Data on the most commonly used manipulatives will assist teacher educators when planning mathematics education courses. Also teacher educators will be able to assist new teachers to manage

the issues such as classroom management of manipulatives so that this no longer impedes the use of manipulatives.

As with most research, the survey raised further questions that require in-depth research. For example money was ranked as the number one impediment to the use of manipulatives. This result was surprising, given that it was not mentioned in previous survey research. Computers may be found in every primary school and require replacement every three to five years and yet there seems little concern about the money required to purchase them, maintain them, load software on to them and connect them to printers and the Internet. It is possible that computers are viewed in a different way to manipulative materials and therefore treated differently. They have become part of a carefully designed purchasing plan that is carefully managed and kept with a current inventory. This does not appear to be the case with mathematics manipulatives in many schools.

Throughout this paper, the argument has been made that manipulatives on their own do not teach – teachers do. Children can often look very busy (active) with manipulatives but that does not necessarily mean that children are learning. Clements (1999) noted that simply using manipulatives as part of a mathematics lesson does not guarantee success.

> Their physicality does not carry the meaning of the mathematical idea. They can be used in a rote manner ... They need teachers who can reflect on their students' representations for mathematical ideas and help them develop increasing sophisticated and mathematical representations (p. 3).

Swan and Sparrow (2004) suggested that in the light of the report on effective teachers of numeracy by Askew, Brown, Rhodes, Johnson and William (1997) and the work of Stein and Bovalino (2001) on manipulatives it is clear that teachers play a key role in helping children construct knowledge by helping them to connect ideas. Fifty years have passed since the proverb quoted at the start of this paper was used as a rationale for the use of manipulatives. This is simply not good enough in the twenty-first century. Swan and Sparrow (2004) argued for manipulative use to be effective, a fourth line should be added to the initial proverb:

> *I talk about it and I connect.*

The results of the present study certainly confirm that for mathematics manipulatives to be effective, they must be part of a carefully planned mathematics program. In particular, teachers' own knowledge of the mathematics, the children and the manipulatives need to be sufficient so as they can assist children to connect the use of the manipulatives to the concept being developed.

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Appendix: Manipulatives Survey

Use of Manipulatives in primary and middle school mathematics classes in Western Australia

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Dear Colleague

We would appreciate your help. To better align our mathematics education units with the realities of classroom life we wish to ask a few questions about the use of manipulatives in the teaching of mathematics. This survey should only take less than ten minutes to complete. We do, however, appreciate that teachers are busy people and therefore we have arranged for an incentive for taking the time to complete the survey. We have three $500 school resource vouchers and three $200 teacher resource vouchers available. These will be awarded on a random basis and the schools and teachers involved will be informed before the end of the school year. In order to gain the most from the survey it is important that we gain as many individual responses as possible and from a variety of year levels across the school.

What will happen to the information?

You may choose to place your name or the name of the school on the survey or you may remain anonymous. If you wish to have the opportunity to receive one of the incentives, simply place your name and school name inside a separate sealed envelope and place it in with the surveys. The envelope with your name will be separated from the surveys and the details entered on our incentives list. After the incentives have been awarded this data will be destroyed.

All information provided will be confidential and no individual schools will be identified. All data records will be stored securely and destroyed five years after the completion of the study. Please note that this project has the approval of the ECU Human Research Ethics Committee.

What are the expected outcomes?

Improved use of manipulatives in West Australian primary and middle school classrooms through:

- improved initial teacher education
- the provision of appropriate professional development
- the provision of quality curriculum materials.

An opportunity

This survey is part of a much larger research project. If you wish to have further involvement with this project we would be happy to interview you about your views on the use of manipulatives (either by phone or personal interview). Also, we are planning to work in schools and provide some Professional Development in the use of manipulatives. Should you be interested in further involvement, please note it on the survey form.

Please note: This research is partially funded by The Association of Independent schools of Western Australia (AISWA), R.I.C publications and by Edith Cowan University.

Any questions concerning this research study can be directed to myself, **Ms Linda Marshall**, on **08 6304 5954**. I am happy to discuss any questions you may have about the questionnaire. If you have any concerns about the project or would like to talk to an independent person, please contact the Research Ethics Officer at the Human Research Ethics Office, Edith Cowan University (phone **08-6304 2170** or email **research.ethics@ecu.edu.au**).

Thank you very much for participating in this research study.
Please complete the questionnaire and return in the reply paid envelope provided by 9 November 2006.

Regards

signature

Linda Marshall
Lecturer in Mathematics Education
Edith Cowan University

Manipulatives survey

Please tick the appropriate box(es).

1. Name of school: _____
2. What year level/s do you teach?

PPK	1	2	3	4	5	6	7	8	9	10

3. For how many years have you been teaching?

0–2	2–5	5–10	10–15	Over 15

4. How often do you use manipulatives?

daily	several times a week	once a week	every couple of weeks	about once a month	never
other					

Manipulatives survey continued

5. What manipulatives have you used in your classroom in the last 2 years?

6. With which year level(s)? _____

7. Do you use them individually, in small groups and/or with the whole class? *(You may tick more than one box.)*

Manipulative	Yes	No	Year level(s)	How often used	Individually	Small group	Whole class	Briefly describe how you use this manipulative
Attribute blocks								
Base ten blocks (MAB)								
Cuisenaire rods								
Multilink cubes								
Pattern blocks								
Polydron/ Geoshapes								
Square tiles								
Unifix cubes								

8. Please use the table below to add any mathematics manipulatives you use that are not included in the previous list.

Manipulative	Yes	No	Year level(s)	How often used	Individually	Small group	Whole class	Briefly describe how you use this manipulative

9. List the three manipulatives that you use the most.

10. To what extent do you think manipulatives enhance children's learning of mathematics?

not at all	rarely	sometimes	usually	always

Please elaborate on your response.

11. What do you think are the main advantages of using manipulatives in the classroom?

12. What do you think are the main disadvantages of using manipulatives in the classroom?

13. Teachers were asked to list the main hindrances to using manipulatives in the classroom. *(Things that get in the way of your using them.)* Please rank their responses from 1 (most important) to 13 (least important).

Behaviour (classroom management)	
Classroom management issues (packing up, lost pieces, sorting sets)	
Lack of knowledge of how to use the manipulative(s) and what manipulatives are available.	
Lack of mathematical content knowledge of how manipulatives may develop specific mathematics concepts.	
Money (cost)	
Noise level	
Organisation of manipulatives (borrowing/returning, sorting)	
Parental expectations	
Space (physical) to use in classroom	
Storage	
Student perception that manipulatives are babyish	
Teacher perception that manipulatives are for younger children	
Time constraints	
Other (please elaborate)	

14. When using manipulatives, will the students' experiences be based on:

Teacher direction		Questions arising from 'self discovery'?	

Please elaborate on your response.

15. Have you participated in any professional development on the use of manipulatives? ☐ Yes ☐ No

If yes, please describe.

16. Which manipulatives would you most like help with?

17. Are there any further comments you would like to make on the use of manipulatives?

Thank you for participating in this survey.

Please return to: Linda Marshall, School of Education, Edith Cowan University, 100 Joondalup Drive, Joondalup WA 6027

As an additional way of collecting information about the use of manipulatives in schools, we are keen to interview some teachers.

An interview would focus on gaining a deeper understanding of some of the issues raised in the survey.

The aim of the study is to improve the use of manipulatives in classrooms, and to provide quality curriculum material and professional development.

If you are willing to be interviewed on the use of manipulatives in your school, kindly complete the attached *consent form* and return it with this survey form.

If you wish to remain anonymous, please return only this survey form.

Please note that confidentiality is assured at all times.

Use of Manipulatives in primary and middle school classrooms

Consent to be interviewed form

I have read and understood the information letter provided that explains the research study and I agree to participate in this research study by being interviewed. I understand and consent to the interview being audiotaped. I understand that my participation is voluntary and that I may withdraw at any time. I also understand that no individual or school will be identified when the results are presented or published.

Participant School:	
Participant Name:	
Contact Number:	
Email address *(optional)*:	
Participant Signature:	Date:

Nuangjamnong, C., Maj, S.P. and Veal, D., Edith Cowan University, Australia

Economic Sustainability of Remote Access Networking Classrooms

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ABSTRACT

Within the higher education domain, there is a prevalent belief that e-learning, virtual classroom and tele-education are essential requirements for the long-term effectiveness and success of educational institutions. Many information technologies have been adopted to assist studying and learning remotely and are hence potentially beneficial to students, teachers and educational providers. For educational providers, the benefits are that there are no physical or geographical limits to the number of students that can be enrolled in a course of study. However, within the field of network technology, students must actually use network devices during their studies. This is important not only because it significantly enhances student learning, but also within this field, employers expect students to have practical 'hands-on' experience. Software simulators are available but they cannot provide students with the necessary practical experience of connecting together the physical devices. Despite the requirements to provide a 'hands-on' approach it effectively eliminates remote on-line students. Edith Cowan University (ECU) invested over AUD$350,000 in dedicated network teaching laboratories, which are considered to be of a 'world-class' standard. An access server has been used to provide remote students with access to this equipment. Significantly it is also possible to view the actual network devices by means of a webcam. Whilst remote access to equipment has been possible students only interact via a computer screen. This work allows students to interact by means of Webcam (visual) and Voice over Internet Protocol (VoIP) (audio). Work to date has consisted of establishing the appropriate infrastructure and testing the communication links. Further trials are planned for semester 2, 2008. Traditional remote access can only operate via Command Line Interface (CLI), this can be difficult for many students to practice and gain experience in computer network and internetworking. In effect on-line students will be able to conduct their workshops on a remotely located 'world class' network laboratory. For students, the on-line curriculum is available twenty four hours a day; there is typically on-line support, and software is now available allowing access to recorded lectures.

Keywords: Computer network education, Distance learning, Remote access classroom

INTRODUCTION

Information technology (IT) is employed in many organizations as a means to support environmental sustainability. The term of sustainability refers to the potential longevity of vital human ecological support systems, such as the planet's climatic system, systems of agriculture, industry, forestry, fisheries, and the other systems on which they belong (Tisdell, 1988). Many educational institutions are being forced to find better pedagogical methods to cope with these new challenges (Jonsson,

2001). Remote access for students can also assist sustainable development. Sustainable development, this refers to a pattern of resource use which focuses to meet human needs and preserving the global environment. According to the United Nations (1987), the grounds for sustainable development are divided into three elements (figure 1): environmental sustainability, economic sustainability and social sustainability.

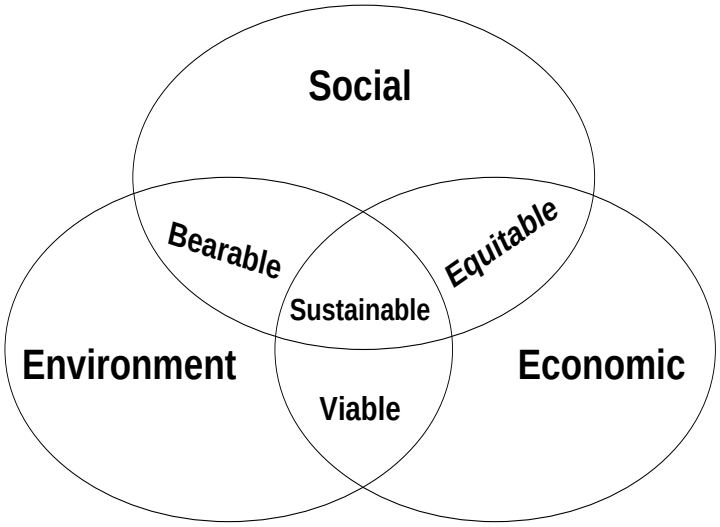

Figure 1: *Sustainable development (the United Nations, 1987)*

These elements have been used and applied in an educational environment which provides explicitly considering technology's possibilities to facilitate social interaction between teachers and students, or among students via technology (Vosniadou et al., 1996; United Nations, 1987). However, while performance, capabilities, demand, skills, practice and experience are significantly increasing, educational providers need to create a sustainable education for generating the best pedagogical models which support learning and teaching environments. In social sustainability, students from developing countries or joint universities can access from their own countries to use the equipment; meanwhile, in terms of economic sustainability; foreign universities do not need to purchase or maintain expensive networking equipment.

Combining the objectives of remote access networking classroom and sustainable development diagram; therefore, the results of the dimensions of sustainability are shown in table1.

Table 1: *The dimensions of sustainability of remote access networking classroom*

	Environment	**Social**	**Economic**
Bearable	- Overseas' students will have a better understanding of computer networks in their own countries	- Creates social long-term learning without being limited to time and place	- For remote students, no need to travel; therefore, this can save some money for travelling, accommodation, petrol, etc.
Sustainable	- No need to travel so students will have plenty of time for practice and gaining skills and experience	- Students can configure the network equipment through remote access laboratory - Allow students to collaborate among	- For collaborative universities, they do not require to buy the equipment - For ECU who provides the equipment; the

		students which lead to be a new social learning group.	university will gain some extra revenue and some intangible benefits
Equitable	- With same lecture note materials and workshops, remote students make them feel to have an equitable to access and gain knowledge as same as local students	- All of equipment can be shared when they are available	- Overseas students have ability to practice with the equipment as the same as another student at ECU
Viable	- Study computer network can be done from anywhere	- Allow students to practice with real workshop in the same material as local students, so they can have an opportunity to discuss the problems and help each other to find out the alternative solutions	- As ECU has invested in physical equipment; those equipment can provide a lot of benefits such as using for research, using for teaching, using for experiment and using for training special course

This paper presents an example of a sustainable remote access networking classroom which can be used as a technological framework for integrating an experimental-based internetworking environment or the other online curriculum for universities. The authors have designed and facilitated a remote internetworking experiment via two communication links; Edith Cowan University (ECU) in Australia - Kobe University in Japan, and ECU – Nakorn Phanom University in Thailand. The main objective of this experiment was to provide networking equipment for both on-campus and off-campus students who live in remote areas or via collaboration with other universities. A remote access networking classroom was designed by focusing upon improving early learning outcomes, fault diagnosis, changing configurations on network equipment and upon other aspects of sustainable technologies. By using a visual (webcam) combined with audio (VoIP) technology, this enabled the possibility of a rich student learning experience.

The objectives of this experiment included:

1. to develop further a student's understanding of computer networks and data communication principles;
2. to develop a student's ability in designing, configuration and monitoring of computer networks;
3. to provide students knowledge of how internetworking protocols are implemented into the networks, network operating systems (NOS) and dedicated embedded hardware;
4. to enhance student understanding of the current standards and future direction in computer networks and data communications;
5. to develop student's ability in analyzing computer network problems and maintaining a network's status.

All of these objectives were included in the experimental remote access networking classrooms.

In this paper, the authors focused upon economic factors in sustainable education in more details than social and environmental influences.

ECONOMIC BENEFIT

In this section, the authors focus upon the remote access experimental classroom by analyzing time management and Cost-Effectiveness Analysis (CEA)

A) Time Management

The School of Computer and Information Science (SCIS) at ECU has two main internetworking laboratories for teaching and learning in computer networks. Fully internetworking equipment, network operating systems, and network applications are provided such as routers, switches, firewalls, hubs and wireless access points (figure 2). Obviously, using internetworking equipment assists students to develop their understanding and improve their networking skills. For semester 1-2008, these laboratories had been utilized five days a week:

Monday	: 12:30 pm – 16:30 pm for Fundamentals of Computer and Network Technology (4 hours)
Tuesday	: 10:30 am – 12:30 pm and 14:30 pm – 16:30 pm for Remote Access (4 hours)
Wednesday	: 09:30 am – 17:30 pm for project and research students (8 hours)
	: 17:30 pm – 21:30 pm for Internetworking 1 (4 hours)
Thursday	: 08:30 am – 12:30 pm for Internetworking 1 (4 hours)
	: 12:30 pm – 16:30 pm for Internet Technology and Management (4 hours)
	: 17:30 pm – 21:30 pm for Internetworking 2 (4 hours)
Friday	: 08:30 am – 12:30 pm for Internetworking 2 (4 hours)
Estimate time	: for maintenance, lecturer and tutor time to test (4 hours)

Thus, the totally percentage of the use internetworking laboratories at ECU was 33.33 while 66.67 was available. This percentage refers that both two laboratories have available for remote students and overseas students.

Figure 2: *Equipment racks in the computer networking laboratory at ECU*

B) Cost-Effectiveness Analysis

In order to investigate sustainable remote access classroom, cost-effective analysis (CEA) is the method has been used. CEA is a financial form of economic analysis in which all expenditure or costs

are related to common effects and outcomes (National Business Group, 2008). CEA can identify the alternative financial outputs, minimizes the actual value of costs, and is a tool for the selection of alternative projects with the same objectives (quantified in physical terms). Three internetworking laboratories have been evaluated (Table 2, 3).

Table 2: *An Investment cost for three internetworking laboratories*

Internetworking Laboratories	**Investment cost (AUD)**	**Annual fixed (Maintenance costs) 10% of investment cost**	**Annual reserve costs 5% of investment cost**	**Total investment cost**
Edith Cowan University (ECU)	500,000	50,000	25,000	**575,000**
*** Kobe University (KU)**	300,000	30,000	15,000	**345,000**
Nakorn Phanom University (NPU)	100,000	10,000	5,000	**115,000**

* The investment cost in internetworking laboratory at KU in Japan has been estimated 50% of investment cost between ECU and NPU

A tuition fee is the primary tangible benefit that we used for analyzing cost-effectiveness. At ECU, for two semesters, the number of postgraduate students who have enrolled internetworking units should be 150 (5 units * 30 students) and estimate that most students are international students; hence, according to ECU International, the fixed tuition fee per head per semester for international student is 8,000 AUD (ECU International, 2008).

At KU, in 2008, the number of postgraduate students who have enrolled in faculty of engineering, major computer science and systems engineering should be 85 (5 units * 17 students) and estimate that most students are local students; hence, according to KU prospective students, the fixed tuition fee for both international and local student per head per year is 535,800 YEN (Kobe University, 2008). (1 AUD: 101 YEN: 3 July 2008; Currency.com, 2008)

NPU, in 2008, had no postgraduate students in the faculty of computer science, faculty of information technology and faculty of engineering, as NPU is a new government university and was established in 2005 by combining the local existing institutions. For two semesters in undergraduate program, this university has run only one internetworking unit per year; thus, the number of undergraduate students who have enrolled internetworking units should be 30 (1 unit * 30 students) and estimate that almost students are local students. For the government university, the estimated tuition fee per head per semester is about 8,500 BAHT in faculty of science (Nakorn Phanom University, 2008). (1 AUD: 32 BAHT: 3 July 2008; Currency.com, 2008)

Table 3: *Benefits from each university*

Internetworking Laboratories	**Tuition fees (AUD)**
Edith Cowan University (ECU)	**2,400,000** (16,000 AUD * 150 students)
Kobe University (KU)	**450,921** ((535,800 JPY/101)*85 students)
Nakorn Phanom University (NPU)	**7,969** ((8,500 THB/32)* 30 students)

For **Cost-Effectiveness Ratio =** $\frac{\sum \textbf{Benefits}}{\sum \textbf{Costs}}$

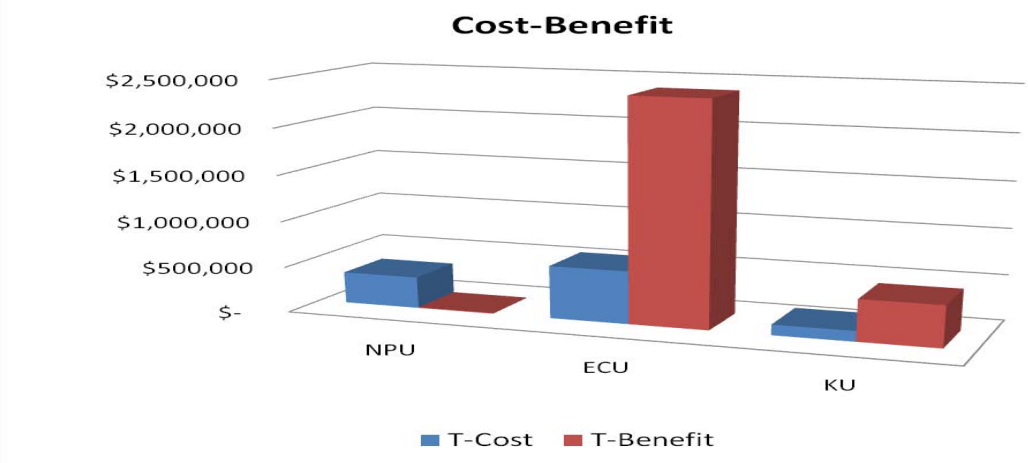

Figure 3: *The comparison of investment cost and benefit at NPU, ECU and KU*

It can be clearly seen on figure 3, the comparison of investment cost of each university in networking laboratory and tangible benefit. Comparing with NPU and KU, ECU has gained a huge benefit from its investment as seen in figure 4.

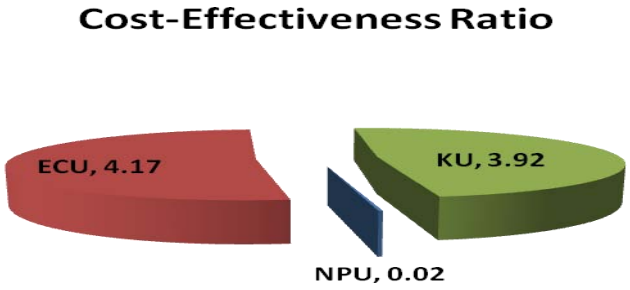

Figure 4: *Cost-Effectiveness Ratio*

THE REMOTE ACCESS NETWORKING CLASSROOM

In the networking laboratory, remote students can access network equipment via the website (Web Conferencing Services) and then connect through an access server which is password protected. In order to configure the network equipment at ECU, the use of the CLI, Webcam and Voice over Internet Protocol (VoIP) are used in the laboratory in this experiment. The CLI is used to configure the equipment whilst the webcam and VoIP are used for communication between students and lecturers to identify the problems and to assist when required. Remote students can choose which network topologies and technologies they wish to practise. In this experiment, network topologies, workshop instructions, and lecture notes are provided. Figure 5 shows the connectivity by using remote access to configure networking equipment.

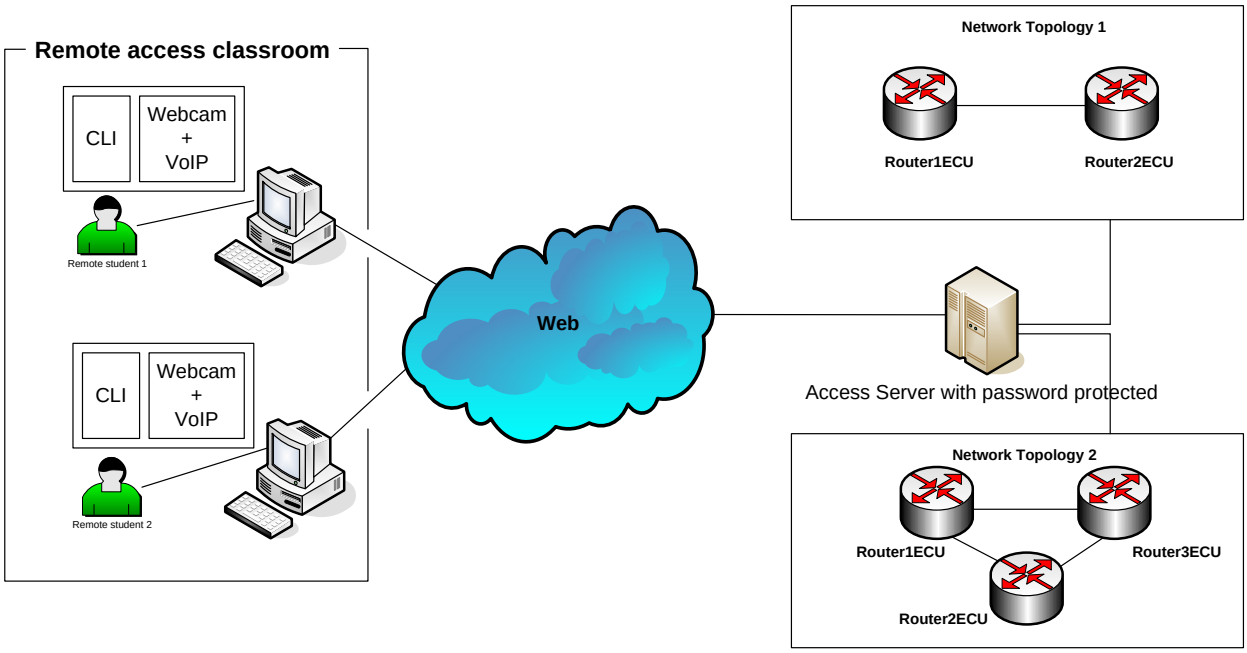

Figure 5: *The connectivity of the remote access classroom*

After providing workshops, network topologies and lecture notes, the physical networking equipment has been prepared and setup, the authors noted that all the connections and networking equipment seemed to be match with the network topologies and workshop instructions. By observation in this experiment, the authors noted that it was successful in enhancing the learning of the remote students. However, some technical problems during the experiment need to be addressed.

A) The increasing role of using remote networking classroom

The remote access networking classroom at ECU, is a dedicated laboratory that has fully networking equipment for supporting teaching and learning. The experimental projects between ECU-KU and ECU-NPU have shown that the remote access networking classroom provides sustainable economic, environmental and social benefits in learning and teaching processes. According to Bransford et al. (2000), a conceptual framework is to represent facts and ideas while practicing with physical equipment assist learner in gaining superior knowledge, skills and experience.

In terms of economic, remote students do not need to travel; this can help students to save petrol, travel costs, time, and accommodation. According to Laitner (2003), the usage of IT from remote site could reduce the growth in carbon emissions by over 67 percent.

The remote access networking classrooms also bring many social benefits to both teachers and student life. For example, creating a new social long-term knowledge and learning by sharing skills, experience and resources. Some special collaborative projects from remote universities can be operated via remote access. To allows teachers and students to have flexible work and time to study. According to Massy and Zemsky (1995), to make learning more productive is to make it available and possible for students to get the resources that they need when they need them.

B) An awareness of remote classroom

There are some challenging issues which are of concern in remote access classrooms. Firstly, some remote students might learn better in a traditional classroom. They need the live interaction with an instructor and other students. Even through, a remote access networking classroom may try to simulate classroom interaction, they cannot duplicate it completely because it is virtual and not real. In order to succeed at using remote access networking classroom effectively, some remote students need to have

some specific skills in configuration and fault finding. They have to be self-motivated, responsible for their own learning and they should also have good time management skills. If they do not have those skills, traditional classes may be a better alternative.

In some developing countries the major challenge of using remote access is accessibility. Not everyone and every university have ready access to computers with an internet connectively. Without this provision, it is hard to make remote access networking classrooms a viable reality. The importance of the online environment is flexibility and portability for many teachers, students and staff and hence remote access classrooms may a good solution.

CONCLUSIONS

This paper has presented the sustainability remote access networking classroom which provides the potential for beneficial teaching and learning for many students, staff and universities especially in developing countries. A significant issue for sustainability remote access networking classroom is to provide not only low cost access to network equipment but also an improved pedagogical outcomes for remote students. Involving students in remote on-line university can potentially overcome the problem of the lack network equipment with which to practise and study. By using a webcam and VoIP technology, this can assist remote students to diagnosis networking problems immediately. For the provider university, in this case - ECU, the remote access networking classroom provided both tangible and intangible benefits. Only limited trials have so far been conducted. More trials and research in this important area are needed.

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Attitudes Toward Teacher Styles and Teaching Styles in an International Business Management Program: Case Study Comparison

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ABSTRACT

The researcher utilized a descriptive method of research, and the data was interpreted, analysed, discussed and presented by using the descriptive-analytical one. The objective was to identify the teacher styles and the teaching styles that encourage lifelong learning in an International Business Management (IBM) program comparing a native English-speaking university (Whitworth University, USA) with a non-native English-speaking one (Payap University, Thailand).

The results showed that satisfactory teacher styles and teaching styles encouraged students toward lifelong learning. The styles have to be equally balanced between ***teacher styles***: teacher-oriented method, task participation of students, and independent study, and ***teaching styles***: based on textbook; research and information system management; and experience and practice.

There was no significant difference in the attitude of the teachers and students in a native English-speaking university and a non-native English-speaking university regarding the satisfactory teacher styles and teaching styles compared with their expectation and experience. Teachers and students in both universities had positive attitudes toward the satisfactory teacher styles and teaching styles, and their expectation was at a higher positive attitude than their experience. Students in a native English-speaking university had no different expectations and experience from their teachers - Both had positive attitudes. In sight of a non-native English-speaking university, teachers and students had the same positive expectation toward the satisfactory teacher styles and teaching styles but students had a different experience from their teachers - Teachers had positive experience but students had neutral experience, with a statistical significance of 0.05 level.

Furthermore, the attitude evaluations between teachers and students toward teacher styles and teaching styles indicated a small gap with an accepted-level for developing teachers and students' expectation and experience in lifelong learning.

Keywords: Teacher Styles, Teaching Styles and International Business Management Program

INTRODUCTION

The greatest power of humanity is education. It shapes their careers and makes them differentiate in their thinking, speaking and doing activities beyond world competition. The successor is the one who can apply sustainable education to become the good leader and the good follower under changing situations of lifelong learning. Especially in globalization, education should be achieved through international based learning. It means learning how to build individual human ability, to apply knowledge from classroom to real life with flexibility to the changing world, to understand international concepts, to understand parallelism between the domestic concepts and the international concepts, to focus concern on human beings and cultural differentiation with a positive attitude. Students are input and output of the educational system. They are the important part of class design.

Students participating in Study Abroad Programs (SAPs) designed to increase students' exposure to different cultural contexts were surveyed. The study measures world-mindedness, the extent to which individuals value global perspectives on various issues. It was hypothesized that participation in a SAP and the cultural difference between a student's point-of-origin and SAP location will have a positive impact on the development of world-mindedness. The results support the research hypotheses, and offer insight into preparing business students for a culturally diverse work place (Douglas 2001).

Teachers and teaching styles are effected factors of student learning ability in the educational system. Teaching refers to the actions of a real live teacher designed to impart learning to the student. Many universities and education institutions are still concerned with focusing on teacher-oriented learning, teachers lecture their knowledge, a classic learning method which is challenged and criticized broadly. The learning method has shifted to student-oriented learning creating many styles of teacher, and teaching for developing teachers and students' skills in lifelong learning. The way teachers teach should match the way students learn. The concern of teachers should be the students' style of learning. Teachers can then adapt their teaching styles to suit the learning styles of students. The heterogeneous mix of student learning styles are divided to the group learning style so that teachers can best adapt their teaching style and materials to suit the students' group learning style. Any study on learning styles could be extended by examining the impact on students' performance relative to the teachers' style of teaching. One may also wish to examine the relationships between learning styles and personality traits to better understand the characteristics of students, which dictate their learning styles. Students may adopt different learning strategies for different subjects or in different learning environments. How students react to the varying situations depends on the make-up of the students, that is, their personality traits. A personalized education is needed to match the learning environment with the learners' learning styles (James Poon Teng Fatt 2000).

The effective educational system should reply by the satisfactory of teachers and students which places of their experience reaches their expectation. The satisfactory learning styles are interpreted by the effective learning evaluation methods which must be two-way feedback. The two-way fast feedback is springing up at colleges and universities nationwide. The key idea is for teachers to use simple surveys to get fast feedback from students at all or most class meetings and then, in return, give students prompt, detailed feedback (oral or written) on their feedback. Two-way fast feedback leads to never-ending improvement of teaching and learning via correction of teaching flaws reported by the students. It also opens up a second channel of communication between the teachers and students. Students read and value fast, reverse feedback. Through time, the frequency of teaching flaws is gradually but steadily reduced. Many flaws are obvious, such as illegible writing on the blackboard, but seem to require student feedback to be brought to the attention of even the most experienced teachers. A sample feedback sheet is presented. (Bateman 1995)

This section provides in the research period, the researcher was an instructor and head of the International Business Management (IBM) program, which was an international undergraduate program of Payap University, Chiangmai, Thailand, who received the United Board grant to be a visiting professor at the School of Global Commerce and Management School, Whitworth University, Spokane, WA, USA from March to May 2004 doing the research topic of "ATTITUDES TOWARD TEACHER STYLES AND TEACHING STYLES IN AN INTERNATIONAL BUSINESS MANAGEMENT PROGRAM: CASE STUDY COMPARISON"

The historical background of the comparative study universities, the native English-speaking University, Whitworth University (USA) was recognized in 1890 and has a long tradition of welcoming international students who are attracted to the university's mission of providing an education of mind and heart. Students come from more than 20 countries around the globe to engage in all aspects of campus life at Whitworth University. International students enrich the Whitworth community with their perspectives and join with all students in preparing to be thoughtful and well-informed global citizens. Consistently one of Whitworth's largest academic areas, the School of Global Commerce & Management boasts faculty members who combine strong academic credentials with

extensive practical experience and a focus on the increasing globalization of markets. In keeping with Whitworth's mission, the department's faculty and curriculum reflect a strong emphasis on values and ethics within a rigorous academic program. The department also maintains close connections with business and professional communities in the USA and abroad to provide a variety of internship, mentoring and service-learning opportunities to help students prepare for meaningful and successful careers (School of Global Commerce & Management, Whitworth University 2004).

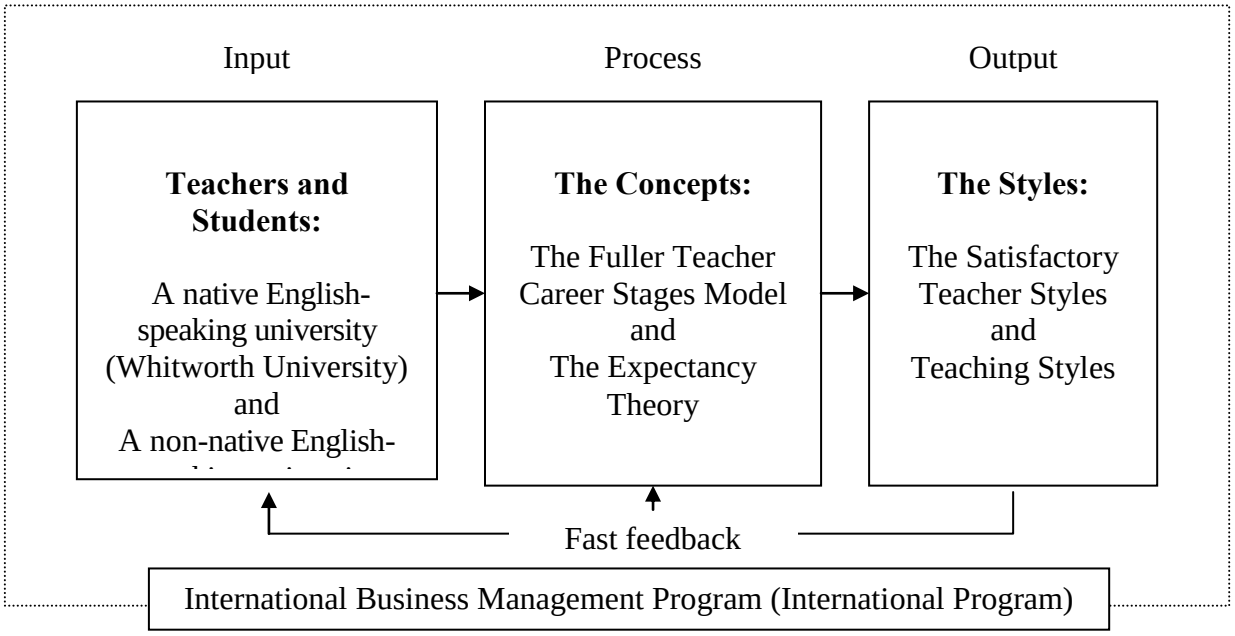
In other words, the non-native English-Speaking University, Payap University (Thailand), established in 1974, is a private institution founded by the Church of Christ in Thailand. Payap is a founding member of the Association of Private Higher Education Institutions in Thailand, and an active member of the Association of Christian Universities and Colleges in Asia, as well as the Association of Southeast Asian Institutions of Higher Learning. Payap University's achievements were recognized by the Royal Thai Government in 1984 when it became the first fully accredited private university in Thailand. Since then the university has continued progressively expanding facilities to accommodate the steady growth in the student body, investing in the continuing education and training of the faculty through university support of graduate education in the USA and in other countries, and adding a wide range of international programs to attract students from across Southeast Asia and from other areas of the world. The International Business Management (IBM) department was one of the International College's largest academic programs. The IBM program focused on the rapid globalization of business thus creating a tremendous need for broadly educated, multi-lingual workers, managers, and business leaders. This program strives to provide students a comprehensive background in the full range of business disciplines, while offering this education in a environment that stresses the university's commitment to "Truth and Service". The IBM program addresses the national need for well-trained, skilled business professionals by offering Payap students a broad course of study. (International College, Payap University 2004)

An opportunity was made available to examine comparative studies in the teacher styles and the teaching styles of International Business Management program between the native English-speaking university, which had the philosophy in an education of mind and heart and established the international program since 1992, and the non-native English-speaking university, which believed in an education of truth and service and established the first year of their international program in 2004.
A concerned-point was quality development of the IBM program to reach international standard learning, especially the satisfactory teacher styles and teaching styles encouraged students toward lifelong learning. The teachers and the students were the input of this research which effected change in program quality and also their satisfactory toward teacher styles and teaching styles which placed their experience reaching their expectation was the output which replied the styles developing to close the gap between their expectation and their experience.

The concepts that were applied to this research included (1) **The Fuller Teacher Career Stages Model** (Lasley 1997) that is the Fuller's model of teacher development, based on an analysis of teachers' concerns, posits a three-stage model of teacher development moving from (a) concerns about self, to (b) concerns about tasks, to (c) concerns about students and the impact of teaching. This study applied Fuller's widely cited model of teacher development to become two categories: *teacher styles*: teacher-oriented method, task participation of students, and independent study, and *teaching styles*: based on textbook; research and information system management; and experience and practice, (2) **The Expectancy Theory** (Lussier 1993) that is the motivation theory which explained in order to enhance the performance-outcome tie persons should use systems that tie rewards very closely to performance. It is applied to motivate teachers and students learning behavior in relation to their satisfactory teacher styles and teaching styles in their expectation and their experience. It will be useful for developing teacher styles and teaching styles to reach the program objectives, and (3) **The System Viewpoint** (Hellriegel 1992) that combined four steps as follows: (a) input are those things that affect changes and might well be considered processes, (b) process are those continuing elements of an education system that provide the "working" interior of the system, (c) output are just that - the output of the educational system, often presenting measurable elements to the world, and (d) feedback

is a circular causal process whereby some proportion of a system's output is returned to the input. This is often used to control the dynamic behavior of the system. "Fast feedback:" can be used for collecting data over-time to monitor and assess progress, which applied to run and continue the research processes: the input were teachers and students in the IBM Program of a native English-speaking university (Whitworth University, USA) and a non-native English-speaking university (Payap University, Thailand), the process applied the Fuller Teacher Career Stages Model and the Expectancy Model, and the output was the satisfactory teacher styles and teaching styles which became the fast feedback of developing input and process continuously, as shown in the conceptual framework of the study in figure 1.

Figure 1: The Conceptual Framework of the Study



RESEARCH OBJECTIVE

To study the satisfactory teacher styles and teaching styles, encouraging students towards lifelong learning in a culturally diverse atmosphere of an international program.

RESEARCH HYPOTHESES

There were 3 Hypotheses. **Hypothesis 1:** There was no significant difference in the attitude of the teachers and the students in the native English-speaking University (Whitworth University, USA) toward the satisfactory teacher styles and teaching styles compared with their expectation and experience. **Hypothesis 2:** There was no significant difference in the attitude of the teachers and the students in the non-native English-speaking University (Payap University, Thailand) toward the satisfactory teacher styles and teaching styles compared with their expectation and experience. And **Hypothesis 3:** There was no significant difference in the attitude of the teachers and the students in the native English-speaking University (Whitworth University, USA) and the non-native English-speaking University (Payap University, Thailand) toward the satisfactory teacher styles and teaching styles compared with their expectation and experience.

RESEARCH METHOD

The researcher utilized a descriptive method of research, and also the data was interpreted, analyzed, discussed, and presented by using the descriptive-analytical method (Mario F.Triola, 1995). First,

through the use of **descriptive statistics**, researcher can describe some of the characteristics of the distribution of scores have collected, such as the average score on one varieble or the degree that one score varies from another. Finally, once the data are organized in such a way that they can be closed examined, the researcher will apply the set of tools called **inferential statistics** to help researcher make decisions about how the collected data relate to the original hypotheses and how they might be generalizable to a larger number of subjects than those who were tested (Salkind 2003a).

RESEARCH DESIGN

The collecting data areas were 2 universities: (1) the native English-speaking University (Whitworth University, USA) and (2) the non-native English-speaking University (Payap University, Thailand). The research period was since January to December 2004 (Collecting data period was from March to May 2004) studying 57 from 59 teachers and students, who were in the international undergraduate program and studied in opened courses during the datum-collecting.

RESEARCH PARTICIPANTS

There were 42 respondents (9 teachers and 33 students), in the native English-speaking university (Whitworth University, USA), who were the teachers and the students of International Management Program or Business Management Program (School of Global Commerce & Management, Whitworth University, 2004). And there were 15 respondents (4 teachers and 11 students), in the non-native English-speaking university (Payap University, Thailand), who were those of International Business Management Program (International College, Payap University, 2004).

Independent Variables were the attitudes of the teachers and the students were in the native English-speaking University (Whitworth University, USA) and the non-native English-speaking University (Payap University, Thailand), and the Dependent Variables were the satisfactory teacher styles and teaching styles that encouraged students towards lifelong learning in the International Business Management Program (International Program). The respondents are divided, ie. being representatives of teachers and students in the native English-speaking University (Whitworth University, USA) and the non-native English-speaking University (Payap University, Thailand), as shown in table 1.

RESEARCH MATERIALS

Research instruments and techniques were participative-observation and questionnaire by using Likert's scale, are scored by assigning a weight to each point along the scale, and an individual's score is the average across all items. It is often referred to as the method of summated ratings (Salkind 2003b). This method used in attitude scales that requires the individual to agree or disagree to a set of statements using a five-point scale (Salkind 2003c) which is set up for the questionnaire of attitude of the teachers and the students toward the satisfactory teacher styles and teaching styles compared with their expectation and experience. The researcher analysed and interpreted the scales, as shown in table 2.

The questionnaire is divided into two parts. **Part 1:** General data, there were 9 questions of general data that were analyzed in terms of educational status, educational period in university, gender, age, marital status, income and nationality. If the respondents were teachers, the extra questions were related to their program responsibility and experience in teaching. **Part 2:** Attitude Data, there were 30 questions regarding attitude data, that were analyzed in term of the satisfactory teacher styles and teaching styles compared with their expectation and experience, as details shown in table 3.

RESEARCH PROCEDURE

In seeking the content validity, the draft of the questionnaire was forwarded to the researcher's advisor for their comments and suggestions then was forwarded to the following experts in the topic being studied. The experts were in management and education fields.

To ensure reliability, the draft of the questionnaire was forwarded to 20 respondents who were in International programs by Test-retest reliability type, a measure of stability. Researcher administers the same test/measure at two different times to the same group of participants (Salkind 2003d). The test was on January 2004 and the retest was on March 2004. The result showed that the Pearson Product Moment Correlation Coefficient (r) equalled to 0.80. It meant that both tests had the same values, related to high reliability of the questionnaire which can be used in this research (Salkind 2003e).

RESEARCH ANALYSIS

The score were statistical used via Statistical Packages of the Social Sciences (SPSS) program, which is the world's leading statistical software used by commercial, government, and academic organizations to solve business and research problems, in analysis and interpretation, as shown in Table 4. The decision on whether to accept or reject the null hypothesis (H_0) at 0.05 levels of significance was based on the following criteria: H_0 was accepted if the computed-significant value is equal to or greater than 0.05., and H_0 was rejected if the computed value is less than 0.05.

RESEARCH RESULTS

General Data

The comparison results of general data between the native English-speaking University (Whitworth University, USA) and the non-native English-speaking University (Payap University, Thailand) is followed as table 5.

The main results presented that the ratio of teachers and students in the native English-speaking University were 1:4 and the ratio of teachers and students in the non-native English-speaking University were 1:3.

Teachers and students who were in the native English-speaking University had more educational period (more studying period or more working period) in university than teacher and students who were in the non-native English-speaking University. The majority of teachers in the native English-speaking University had more educational period in university than the teachers in the non-native English-speaking University. Their educational periods in university were in between 11-15 years and less than 1 year accordingly. And also the majority of students in the native English-speaking University had more educational period in university than the students in the non-native English-speaking University. Their educational periods in university were in between 3-4 years and less than 1 year accordingly.

The majority of respondents in both universities were male, almost in the same range of age teachers were in their fifties and students were in their twenties, and almost in the same marital status – most teachers were married and most students were single. The ranges of income – varied both teachers and students in the native English-speaking University had higher income than teachers and students in the non-native English-speaking University except the students who had received scholarships including

education welfare. In case of the income of respondents was appropriately related to the cost of living in each country. The teachers in both universities had the same range of income, but the students who were in Thailand had a higher range of income than those who were in USA. (The data from participative-observation showed that in case of the USA-respondent income is divided by 8 the present value will approximately equal to the Thai-respondent income.) In terms of the atmosphere and cultural distinction, the teachers and the students in the non-native English University were more diverse.

In regard to the teachers' responsibility and experience in teaching, all teachers in the native English-speaking University had taught both the graduate and undergraduate programs. In the non-native English-speaking University, half of the teachers had taught only the undergraduate programs and the rest of them had taught both the graduate and undergraduate programs. Half of the teachers in the native English-speaking University had experience in teaching more than half of teachers in the non-native English-speaking University. Their experiences in teaching were greater than 16 years and in between 5-10 years accordingly.

Attitude Data

The satisfactory teacher styles and teaching styles were able to encourage students toward lifelong learning in diverse cultural atmosphere of the international program. The styles have to be equally balanced between ***teacher styles***: teacher-oriented method, task participation of students, and independent study, and ***teaching styles***: based on textbook; research and information system management; and experience and practice.

Their attitudes are shown as follows:

There was no significant difference in the attitude of the teachers and the students in the native English-speaking University (Whitworth University, USA) toward the satisfactory teacher styles and teaching styles compared with their expectation and experience. Both had positive attitude, with a statistical significance of 0.05 level.

There was a significant difference in the attitude of the teachers and the students in the non-native English-speaking University (Payap University, Thailand) toward the satisfactory teacher styles and teaching styles compared with their expectation and experience. Both had same positive expectation toward the satisfactory teacher styles and teaching styles but the students had different experience from their teachers – the teachers had positive experience but the students had neutral experience, with a statistical significance of 0.05 level.

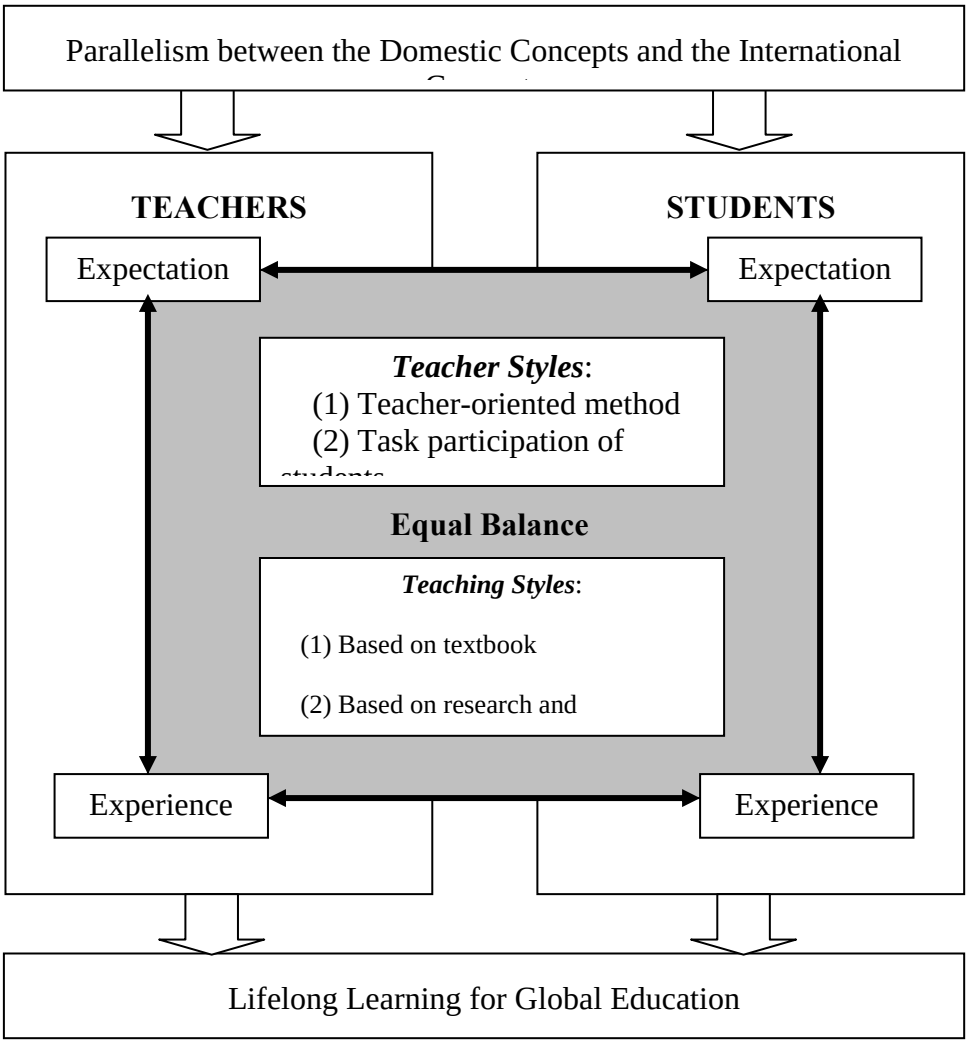
There was no significant difference in the attitude of the teachers and the students in the native English-speaking University (Whitworth University, USA) and the non-native English-speaking University (Payap University, Thailand) regarding the satisfactory teacher styles and teaching styles compared with their expectation and experience. The teachers and the students in both universities had positive attitude toward the teacher styles and the teaching styles, and their expectation was at a higher positive attitude than their experience, with a statistical significance of 0.05 level.

Furthermore, the attitude evaluations between the teachers and the students toward the teacher styles and the teaching styles indicate a small gap with an accepted-level for developing teachers and students' expectation and experience in lifelong learning, as shown in figure 2.

The way teachers teach should match the way students learn. The teachers should adapt their teacher styles and teaching styles to suit the learning styles of the students. Any study on learning styles could be extended by examining the impact on the students' expectation and experience relative to the teacher styles and the teaching styles. The teachers and the students may adopt different styles in

different learning environments parallelism between the domestic concepts and the international concepts to reach the objective of lifelong learning for global education

Figure 2: The Model of Teacher Styles and Teaching Styles that Encourage Students towards Lifelong Learning



CONCLUSION

The education is lifelong learning, Lifelong learning provided with learning opportunities at all ages and in numerous contexts: at work, at home and through leisure activities, not just through formal channels such as school and higher education. Lifelong education is a pedagogy often accomplished through distance learning or e-learning, continuing education, home schooling or correspondence courses. So long as higher education developed the effected process to learning that was teacher styles and the teaching styles to motivate students toward lifelong learning. The students' intrinsic motivation will be drive them to seek more knowledge in accordance with their social context. This can be effectively done by using balance between ***teacher styles***: teacher-oriented method, task participation of students, and independent study, and ***teaching styles***: based on textbook; research and information system management; and experience and practice. This involved reference to James Poon Teng Fatt (2000) that the way teachers teach should match the way students learn. The concern of

teachers should be the students' style of learning. Teachers can then adapt their teaching styles to suit the learning styles of students

The effective learning evaluation method was the two-way fast feedback comparing expectation with experience of the teachers and the students toward their satisfactory teacher styles and teaching styles. The attitude evaluations indicated a small gap with an accepted-level for developing teachers and students' expectation and experience in lifelong learning. This is the same concept as Bateman (1995) that two-way fast feedback leads to never-ending improvement of teaching and learning via correction of teaching flaws reported by the students.

The model from the output included in this research (see Figure 2) can apply to develop the teacher styles and the teaching styles to indicate a small gap in an accepted-level of the teachers and the students in international program, especially the IBM Program of the non-native English-speaking University (Payap University, Thailand) to become qualified internationally educational program. When the core of the education is found, global education will emerge for both the teachers and the students same as the satisfactory level of the native English-speaking University (Whitworth University, USA). It supports the research results of Douglas (2001) that location will have a positive impact on the development of world-mindedness by offering insight into preparing business students for a culturally diverse work place (Douglas 2001).

The teachers and the students who were in parallelism between the domestic concepts and the international concepts learnt how to develop their experience reaching their expectation. They had to close that gap between their expectation and their experience of the satisfactory teacher styles and teaching styles encouraged students toward lifelong learning: to build individual human ability, to apply knowledge from classroom to real life with flexibility to the changing world, to understand international concepts, to understand parallelism between the domestic concepts and the international concepts, to focus concern on human beings and cultural differentiation with positive attitude in global education, and to ship their careers and makes them differentiate in their thinking, speaking and doing activities beyond world competition.

The recommendation for further study, the research should be repeated within the same group of respondents in the IBM program when they are in the fourth year (end of international program of Payap University), comparing the IBM Program with other international programs in the same university, comparing more native English-speaking universities and non-native English-speaking universities, and studying the points of view of educational philosophy and the atmosphere of international education.

ATTRIBUTES

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APPENDICES

Table 1: The Respondents

No.	Respondents	Population	Sampling
The native English-speaking University (Whitworth University, USA)			
1	Teachers	9	9
2	Students	35	33
The non-native English-speaking University (Payap University, Thailand)			
3	Teachers	4	4
4	Students	11	11
Total		**59**	**57**

Table 2: Likert's 5-Scale

Questionnaire Scale	Range of Mean Values	Descriptive Interpretation
5	4.50-5.00	Strongly Positive
4	3.50-4.49	Positive
3	2.50-3.49	Neutral or Moderate
2	1.50-2.49	Negative
1	1.00-1.49	Strongly Negative

Table 3: The Questionnaire Design

No.	Styles	Question No.
Teacher Styles		
1	Teacher-oriented	1-5
2	Participation	6-10
3	Self-studying	11-15
Teaching Styles		
4	Based on theory	16-20
5	Based on information system and new knowledge	21-25
6	Based on experience and practice	26-30

Table 4: Statistical Treatment of the Data Followed the Statement of the Problems

No.	Statement of the problems	Statistical Treatment of the Data
1	What was the profile of respondents in terms of educational status, educational period in university, gender, age, marital status, income and nationality? If the respondents were teachers, what was extra profile in term of their program responsibility and teaching experience?	*Frequency* *Percentage*
2	What was the attitude of the respondents toward teacher styles and teaching styles?	Weighted Arithmetic Mean Standard Deviation
3	To what extent did the attitude of the teachers and students in the native English-speaking University (Whitworth University, USA) toward the satisfied teacher styles and teaching styles compared with their expectation and experience?	Weighted Arithmetic Mean Standard Deviation T-Test
4	To what extent did the attitude of the teachers and students in the non-native English-speaking University (Payap University, Thailand) toward the satisfied teacher styles and teaching styles compared with their expectation and experience?	Weighted Arithmetic Mean Standard Deviation T-Test

5	To what extent do the attitude of the teachers and students in the native English-speaking University (Whitworth University, USA) and the non-native English-speaking University (Payap University, Thailand) toward the satisfied teacher styles and teaching styles compared with their expectation and experience?	Weighted Arithmetic Mean Standard Deviation T-Test

Table 5: Comparison of General Data between
A Native-English speaking university (Whitworth University, USA) and
A Non-native English-speaking university (Payap University, Thailand)

No.	**General Data**	**Native English speaking university (Whitworth University, USA)**		**Non native English speaking university (Payap University, Thailand)**	
		Teachers	**Students**	**Teachers**	**Students**
1	Educational Status	9 persons	33 persons	4 persons	11 persons
2	Educational Period in University	11-15 yrs	3-4 yrs	< 1 yr	< 1 yr
3	Gender	male	male	equally	male
4	Age	> 50 yrs old	20-29 yrs old	20-39 yrs old and > 50 yrs old	20-29 yrs old
5	Marital status	Married	Single	Married	Single
6	Income	In group of range 160,000-199,999 baht (Distribute higher than 80,000 baht)	In group of range Less than 5,000 baht and 10,000-29,999 baht (Distribute less than 80,000 baht)	In group of range 10,000-29,999 baht	In group of range less than 19,999 baht
7	Nationality	USA : Others = 9:0	USA : Others = 10:1	Thai : Others = 3:1	Thai : Others = 1:1
Teacher Only					

8	Program responsibility	Both Graduate and Undergraduate programs		Only Undergraduate Programs and Both Graduate and Undergraduate programs (Equal)	
9	Experience in teaching	Half of them >16 yrs		Half of them 5-10 yrs	

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The Relationship between Critical Thinking and Language Proficiency of Malaysian Undergraduates

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ABSTRACT

In the present information era, university students are expected to be able to think critically so that they will be able to keep up with the changes brought about by new technological innovations and have better chances of employability. Since language is an important tool for acquiring knowledge at the tertiary level, it is therefore important to gain insight into the nature of the critical thinking ability of undergraduates and its possible link to their language proficiency. This study examined the critical thinking ability of Malaysian undergraduates and its relationship to language proficiency. The Bahasa Malaysia version of the Cornell Critical Thinking Test (CCTT) Level X was administered to 280 undergraduates. Results indicated that the critical thinking ability of the undergraduates was much lower than that of their American counterparts. Nevertheless, significant correlations were found between their critical thinking ability and English language proficiency as measured by two national-level tests. Implications for teaching and future research are discussed in this paper.

Keywords: Critical thinking and language proficiency

INTRODUCTION

The emergence of the information age has created great demands for "knowledgeable workers" and "smarter graduates". This has urged many nations to invest in their human capital via education so that they can have a competitive edge over the other nations. However, complaints have been made by employers in many parts of the world such as America (Curry, 1999), United Kingdom and Europe (Bennett et al., 2000) and Malaysia (Nazaria Baharudin, 2004) regarding their distrust in the school, college or university systems of being able to prepare future workers who could meet the demands of the global job market. It seems that there is a mismatch between the skills required by the employers and those acquired by the graduates. Included in this mismatch is critical thinking, a skill which has been claimed to be lacking among the graduates. This harsh reality concerning university graduates has sparked off worldwide interests in research on critical thinking ability of university students.

LITERATURE REVIEW

Critical thinking skills and mastery of English language are expected to become important outcomes of university education in Malaysia. This is so because the country, in its rigorous attempts to realize the nation's goal to achieve the status of an industrialized country by the year 2020, recognizes the need to use English as the language of science, technology and trade, and the need to generate workforce who are proficient in English and critical in their thinking (Abdul Shukor Abdullah, 2000; Awang Had Salleh, 2006). This recognition is reflected in the Malaysian government's decision to

allow the use of English in the teaching of professional courses such as medicine and information technology at the tertiary level (Choi Kim Yok, 2005; Gill, 2002) and replace B.Malaysia, the national language, with English as the medium of instruction for the teaching of Mathematics and Science in all primary and secondary schools beginning from the year 2003 (Choi Kim Yok, 2005; Lim & Normizan Bakar, 2004). These changes made to the education system will definitely affect the teaching and learning process at the university when the first group of school students learning Mathematics and Science in English gain admission to university in 2009 or 2010.

The present importance placed on the need for university students to be critical in thinking and proficient in English is partly attributed to the problem of high unemployment rate in the country. Malaysia has experienced a continuous increase in unemployment rate among graduates ever since the financial crisis which hit the Asian region in 1997. Several studies done to determine the causes of high unemployment rate produced findings which indicate that competency in critical thinking and English language are among the abilities highly sought after by employers. A study involving 2,274 graduates who graduated in 2001 (Morshidi Sirat et al. 2004) revealed communication skills as one of the main skills needed by the graduates to secure a job; i.e., most of the unemployed graduates in the study were found to have low proficiency in English. Another study on 241 employers' view on requirements sought in the graduates (Ambigapathy Pandian and Aniswal Abdul Ghani, 2005) confirms the finding of the former study indicating communication skills, particularly English communication skills, as one of the main six competencies required of the graduates; in addition, thinking skills were also rated to be important competencies by the employers who were interviewed. Similar results were found in a survey study on the perceptions of fifteen human resource personnel of national and multi-national organization in Malaysia (Ain Nadzimah Abdullah & Rosli Talif, 2001) - proficiency in English was a quality that the personnel sought after when hiring new employees and was perceived to be an important contributing factor to an individual's success in the related organizations. These studies have raised awareness among many relevant parties on the crucial need to improve the standard of English and thinking skills among Malaysian undergraduates to enable them secure a job upon completing their studies at the university.

Critical thinking ability has been identified as one of the constructs which has been proven to be a good predictor of academic performance (Tsui, 1998; Giancarlo & Facione, 2001; Moore, 1995). Hence, it is important for relevant university authorities to be informed of the critical thinking ability level of their undergraduates. At present, due to insufficient amount of empirical evidence forwarded, the general critical thinking ability of Malaysian undergraduates is still not that transparent. Relevant information on the matter will, beyond doubt, help the university authority to both improve the academic performance of the students and better prepare them for future work.

Critical thinking is also claimed to be important in the acquisition of language skills particularly writing and reading (Elder & Paul, 2006; Shaharom Abdullah, 2004; Seung-Ryul Shin, 2002; Stapleton, 2001; Moore, 1995), two indispensable language skills that can help undergraduates secure their academic success. However, studies on the relationship between critical thinking and these two language skills, especially those which use second language learners as the sample are still not sufficient. Similarly, there are not many studies conducted on the relationship of the aforementioned construct with general language proficiency.

Research on critical thinking in relation to second language learning is still in its infancy stage. Most of the studies done had been triggered by the claim made by some western scholars who have gone to the extreme of taking a universalist stance claiming that Asian students "are deficient in critical thinking abilities" (Stapleton, 2001, p. 509). Scholars such as Fox (1994) and Atkinson (1997) consider critical thinking as a form of western cultural thinking and they hold the view that Asians students are not able to think critically because such nature of thinking is a form of cultural thinking that is alien to Asians. Nevertheless, two studies carried out on Japanese students (Stapleton, 2001; Davidson and Dunham, 1997) produced results which are able to refute the claim that Asians are deficient in critical thinking skills. The findings of the studies did not only show that Japanese students

had critical thoughts but also indicated that critical skills could be taught to these students in an English language class. However, more research needs to be conducted in other Asian contexts, especially in the Malaysian university context, to investigate if the same results apply to the undergraduates in the related contexts.

OBJECTIVE OF THE STUDY

The present correlational study was conducted to ascertain the critical thinking level of Malaysian undergraduates and determine whether the students' prior ability in English language influences their scores on a test which measures their general critical thinking ability.

METHOD

Participants

The target population of this study was the second year undergraduates of Universiti Utara Malaysia (UUM). This group was chosen based on the assumption that they had undergone at least three semesters of university education which was deemed as an adequate period to have had the students exposed to the kind of learning at the tertiary level which promotes the development of critical thinking. The participants of the present study were 280 undergraduates of four different English proficiency levels: Excellent (N=30), Good (N=50), Fair (N=85) and Poor (N=115). A stratified sampling technique was employed in the study to ensure that the sample used is representative of the target population. The undergraduates were selected based on their grades in the SPM English, a national-level examination. The sampling frame for the study was obtained from the university Students' Academic Affairs Department. The rather small number of undergraduates in the Excellent group compared to that in the Poor proficiency group reflects that majority of the undergraduates at the university were not highly proficient in English.

Instrument

A demographic questionnaire was used to gather data on the undergraduates' performance on two national-level English language proficiency tests run by the Malaysian Examinations Council. The first one was the SPM English which is one of the examinations that all high school students have to sit for at the end of their 5th year to be awarded a certificate (i.e., Malaysia Certificate of Education or 'Sijil Pelajaran Malaysia' -SPM). The grades awarded to the students range from A1 (very good) to 9G (fail). The second English language proficiency test was the Malaysian University English Language Test (MUET), taken prior to admissions to any Malaysian public universities and colleges. The scores attained by the students on the MUET are represented by the bands (1-6) printed on their MUET slips: Band 6 indicates that the test taker is a very good language user while Band 1 reflects that the individual is an extremely limited language user. Both tests are considered as English proficiency tests covering main language skills such as speaking, reading, writing and grammar. The students' self-reported grades on these two tests were then counter checked with those obtained from the Students' Academic Affairs Department to ensure that they were true reflections of actual grades earned. This was done due to doubts raised over the construct validity of self-reported grades (Kuncel et al., 2005).

Cornell Critical Thinking Test (CCTT), Level X

Cornell Critical Thinking Skills Test (CCTST), Level X was used as an instrument to measure the critical thinking ability of the undergraduates involved in the present study. The CCTT is a standardized test developed by Ennis, Millman, and Tomko (1985) and is based on the developers' conceptual definition of critical thinking as "…the process of reasonably deciding what to believe and do" (1985, p.1). The test was considered suitable to be used in the present study because it is claimed by its developers to be a general critical thinking test which attempts to measure "critical thinking skills as a whole" (1985, p. 1). Thus, it is an appropriate test to employ in measuring the critical

thinking ability or level of the undergraduates in this study irrespective of their disciplines, a rationale shared by Nuraihan Mat Daud and Zamnah Husin (2004) and Royalty (1995). Moreover, the test has been widely used throughout the world for more than twenty years for determining critical thinking ability of a group or individuals for the purposes of admission to academic programmes or as a criterion for employment. The reliability coefficient of the CCTT Level X ranges from .67 to .90 (Ennis et al, 1985).

The present researcher strongly believes that in measuring critical thinking ability of individuals, the test administered to the individuals must be in the language that they have competence in so that the scores obtained on the test will not be distorted in any way due to the test takers' deficiencies in the language. Therefore, a test conducted in the national language, that is, Bahasa Malaysia, will be the most suitable one for Malaysian undergraduates since the language concerned is the medium of instruction at the public universities and colleges in the country. Furthermore, mastery of Bahasa Malaysia at a satisfactory level is a requirement for entry to Malaysian universities. For these reasons, the CCTT adopted in the present study was the Bahasa Malaysia version of Level X. The test was translated by Shaharom Abdullah (2004) using Brislin's (1980) back-translation technique and the committee approach (Azlina, 1992). The CCTT Level X was chosen by several Malaysian researchers (Nuraihan Mat Daud & Zamnah Husin, 2004; Syahrom Abdullah, 2004; Faizah Mohamad, 2004) to assess the local undergraduates' critical thinking ability since the test, as claimed by the test developers, has been used among undergraduates and graduates whose language use are not yet sophisticated (Ennis et al, 1985, p.3).

The CCTT is a 76-item multiple-choice test which is to be completed within 50 minutes. 5 of the test items are sample items and the other 71 are the real test items that the test takers have to work on. Each test item has three alternative response choices, A, B, and C, respectively. The test is divided into four parts labelled as Induction (23 items), Credibility (24 items), Deduction (14 items) and Assumption Identification (10 items). Each of the test items that are correctly answered is given a score of 1. In this study, the individual undergraduate's total score obtained on the CCTT was used as a measure of his or her general critical thinking ability; that is, a higher score on the test indicates a better critical thinking ability.

The use of part scores of the CCTT to represent performance on each of the four CCTT dimensions is not encouraged by the test developers since the parts are argued to be overlapped and interdependent (Ennis et al., 1985, p.3) – a non unusual thing to occur for a complicated construct like critical thinking. This, in fact, helps to explain the theoretical difficulty of performing factor analysis on the data based on the CCTT scores. Nevertheless, Ennis et al., (1985) argue for the construct validity of the CCTT based on its content validity (i.e., the fact that the test was developed based on a sound rationale and that the test items were intensively discussed by the test developers who were scholars involved in the Illinois Critical Thinking Project) and correlations with other tests especially those that are also developed to measure critical thinking.

Procedure

This study used part of the data collected for another main study. The translated Bahasa Malaysia version of the CCTT Level X was administered to 280 undergraduates from various programmes of studies. The students were briefed on the test and allowed to ask questions. Most of the students took not more than 50 minutes (as recommended in the test manual) to complete the test. In addition, the students were asked to write the grades that they obtained for the MUET and SPM English in the demographic part of a questionnaire which also included a survey on their general metacognitive awareness.

Data Analysis

The present study employed both descriptive and inferential data analysis procedures. Descriptive statistics like means and standard deviations were computed to provide information concerning the sample and distribution of data and they were also used in the testing of the underlying assumptions of inferential tests employed in the study. The students' SPM English grades were recoded so that the grades were of equal importance to their MUET bands. Five case outliers were identified in the preliminary analysis of the data. These were excluded from the main data leaving the remaining 275 cases (N=275) to be used in further inferential analyses. The reliability of the CCTT and the mean of the total test score were computed before further analyses were carried out. Correlational and structural equation modelling (SEM) analyses were performed on the data to investigate the relationship between the undergraduates' general critical thinking ability and their language proficiency. One-way analysis of variance (ANOVA) was employed to determine if significant differences in the mean of the CCTT scores exist between the four proficiency groups.

RESULTS

The means computed for SPM English and MUET Bands were 5.43 (SD= 2.01) and 2.76 (SD= .846), respectively. These mean values and the results of the stratification procedure indicate that the majority of the sample, which represented its real population, were from the two low proficiency groups. Cronbach's alpha coefficient was used to examine internal consistency reliability for the items within each of the CCTT subscales and for the overall scale. As tabulated in Table 1, the alpha coefficient for the overall scale is adequate (r =.70) and is within the range of reliability estimates reported in the CCTT test manual (i.e., .67-.90). However, the alpha values for the sub-scales ranged from .34 to .58; these values are far lesser than .70. This could be due to the fact that the test employed in this study was the translated version of the original CCTT and the sample used was different from those mentioned in the test manual. Furthermore, the original test developers have never claimed the four sub-scales to be distinct and caution test users of treating them so.

Table1: Reliability coefficients for the Bahasa Malaysia Version of the CCTT

Scale	No. of items	M	SD	α
Induction	**23**	**12.67**	**3.24**	**.56**
Credibility	**24**	**12.33**	**3.08**	**.57**
Deduction	**14**	**9.12**	**2.50**	**.58**
Assumption Identification	**10**	**4.07**	**1.71**	**.34**
CCTT	**71**	**38.17**	**6.65**	**.70**

Note: N=275

The computed mean (M) for the total score on the CCTT obtained by the 275 Malaysian undergraduates was 38.17 (SD= 6.65) with the minimum total score of 20 and maximum score of 55. The computed mean was much lower than the mean of 52.2 (SD=6.5) obtained by the sample norm (i.e., the American undergraduates) which was provided in the CCTT test manual for the basis of comparison purposes. In fact, the mean obtained by the Malaysian sample was lower than any of the norms given in the manual; the lowest mean tabulated in the manual was for the American senior high school students (M= 40.6, SD= 7.9).

A summary of the results of correlations between the variables studied are presented in Table 2. The results revealed that the CCTT was significantly and positively correlated to all measures of language proficiency. This indicated that high scores on the CCTT were associated with high scores on measures of proficiency. Nevertheless, the computed coefficients were within the small range (i.e., <.30) suggesting that the relationships between the variables studied were not that strong. The two measures of English language proficiency (i.e., MUET and SPM English), however, were found to be significantly and strongly correlated (r = .633, n= 275, p<.05) implying both were measures of proficiency in English.

Table 2: Pearson Product-Moment Correlations Between CCTT and Measures of Language proficiency

	1	2	3
(1) MUET	1.000		
(2) SPM English	.633**	1.000	
(3) CCTT	.238**	.288**	1.000

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

A structural equation modelling (SEM) analysis was also performed on data of the study through the employment of AMOS 7.0 (Arbuckle, 2007) to test the fit of the hypothesized structural model for the entire sample. The scores on each of the four sub-scales of the CCTT were used as the indicators which were regarded as observed or measured variables of the critical thinking construct since the use of the total scale on the CCTT together with scores on the MUET and SPM English, as measured variables of language proficiency, could not generate the text output of model fitness for any interpretation to be made (i.e., ran into identification problem since df= 0). The results of this analysis are to be interpreted with care since the researcher has stated earlier that the four sub-scales of the CCTT would not be taken as distinct dimensions of the CCTT.

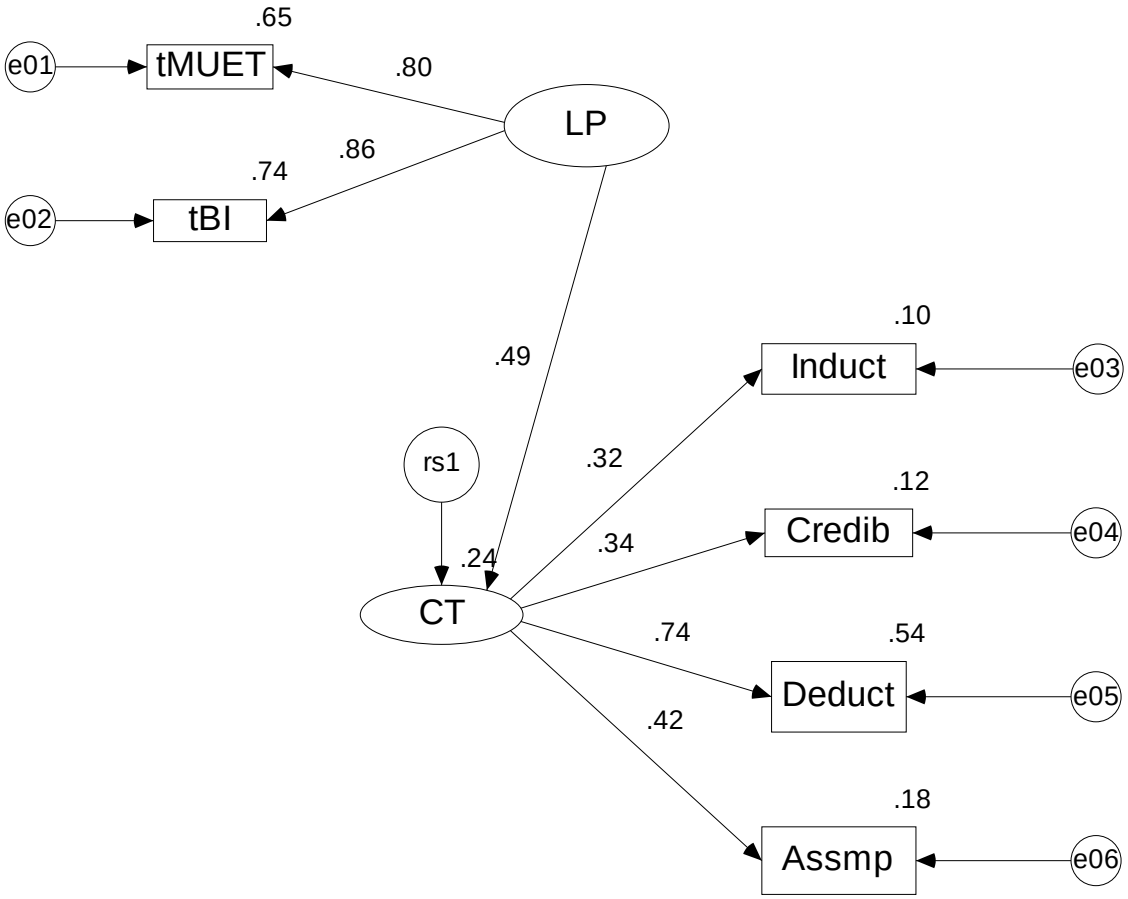

Figure 1: Structural Model of hypothesized relationship between critical thinking and language proficiency.
Chi-square = 13.03, df = 8, chi-square/df = 1.63, p= .111, NFI = .96, TLI = .97, CFI = .98, RMSEA = .048

As shown in Figure 1, the model fits the data well. This is indicated by the non-significant result of the chi-square test (p>.05) and the chi-square/df ratio of less than 2 (Crowley & Fan, 1997). The good fitting model obtained is also indicated by other fit indexes or measures such as NFI, TLI and CFI, each of which showed a value greater than .95. The computed RMSEA value which is lesser than .05 also reflects a good fit to the data (Schumacker & Lomax, 1996).

The SEM output shows a very close resemblance to the results obtained through correlation analysis conducted earlier. The SEM analysis indicated that language proficiency, as measured nicely by the MUET and SPM English, had a significant positive relationship with critical thinking assessed through the CCTT (ß= .49, p < .05). However, as reflected by the multiple squared correlation coefficient of critical thinking with language proficiency (i.e., the value of .24), the latter only accounted for 24 per cent of the variance in the former construct. The beauty of employing SEM analysis in this study is that took into account all errors produced in data analysis and thus produced more reliable results than any other multivariate procedures.

A one-way analysis of variance (ANOVA) was conducted on the CCTT scores obtained by the four different English language proficiency groups to determine whether there were significant differences in the mean scores across the groups. Levene's test was not significant, F(3,271) = .984, p>.05 indicating that the assumption of homogeneity of variances had not been violated. The results showed a statistically significant difference in the mean scores for the four groups, F(3,271) = 10.156, p<.05. The effect size, which was computed by using eta square, was .10.

A Tukey HSD post-hoc test performed on the data yielded results which indicated that the mean score for the Excellent group (M = 43.80, SD = 5.32) was significantly different from the other three groups, Good (M =38.62, SD = 7.17), Fair (M = 37.92, SD=6.53) and Poor (M = 36.65, SD = 6.05). Nevertheless, the mean scores of the three lower proficiency groups were not found to differ significantly from each other.

DISCUSSION

Results suggest that the translated Malay version of the CCTT Level X is a reliable measure of general critical thinking ability of Malaysian undergraduates. Evidence of construct validity of the test could not be forwarded since the data gathered was not found suitable for performing factor analysis procedure. This is not surprising since the test developers of the CCTT have already cautioned the test users of the difficulty in securing distinct factors; that is, they have stated in the test manual that many of the test items can be assigned to more than one of the four proposed aspects of critical thinking. This is argued so because critical thinking is a complex construct. Since measuring a specific aspect of critical thinking is difficult if not impossible, the test developers recommend that the CCTT be used as a general critical thinking ability test. This provides explanation for the use of the CCTT total score instead of the four sub-scale scores in the analysis of the data gathered in the present study. The present researcher relies on the test developers' claim that the CCTT is construct valid based on its content validity and correlations with other cognitive tests as presented in the test manual.

Results of the present study also provide valuable information on the nature of critical thinking ability of Malaysian undergraduates. As indicated by the results, Malaysian undergraduates did display critical thoughts even though their level of critical thinking ability, as indicated by the mean obtained for the test total score, was not found to be equivalent to that of their American counterparts. In actual fact, the computed ability level was found to be lower than that of the American Senior High School students. Similar findings were obtained by Nuraihan Mat Daud and Zamnah Husin (2004) who studied the development of critical thinking skills in reading classes of 40 international undergraduates (from Malaysia, Indonesia, Bosnia, China and Africa) studying at the International Islamic University in Malaysia. Although the researchers did not specifically calculate the mean for the total score obtained by the undergraduates on the CCTT, they did provide the mean for the score on each of the sub-scales. When the means were added by the present researcher, a mean for the overall or total score on the CCTT was obtained for both the experimental and control group involved in the study, respectively. The mean for the former group was 30.04 before the intervention and 35.18 after the intervention. While the mean for the latter group was 20.84 prior to treatment and 23.99 after the treatment. These computed means were found to be much lower than those presented in this study. Shaharom Abdullah (2004) who first used the Bahasa Malaysia version of the CCTT to measure 112 Malaysian undergraduates' critical thinking ability, also found that the undergraduates had a much lower level of critical thinking ability (M=41.80, SD= 5.25) when compared to their American counterparts. A large scale study (Aida Suraya Mohd Yunus et al., 2005) which attempted to determine the critical thinking ability and skills of undergraduates in seven public universities in Malaysia using a newly designed inventory also did not find the undergraduates to have a high level of critical thinking ability; the study revealed that the critical thinking ability of the undergraduates was at a low moderate level.

The present study also provides evidence on the importance of improving the undergraduates' English language proficiency. As revealed by the results, proficiency in English is positively related to critical thinking ability implying that if the undergraduates are proficient in English, their critical thinking ability will also be heightened. Some may disagree with this proposition because the computed correlation coefficients were not large enough to imply anything meaningful. Furthermore, the two different competencies can be acquired independently of each other; that is, there are undergraduates who are proficient in English and yet poor in their ability to exercise critical thinking skills. Nevertheless, one may concur with the weaker version of the proposition made if one considers the

possible interactions between the two competencies – of how they "feed each other" (Brumfit et al., 2005, p.158). The rather weak correlations between language proficiency and critical thinking established in this study lend support to the weaker interpretation of Whorf's theory of linguistic relativity (1941) argued by Hakuta (1986), which proposes that language is not solely responsible for determining one's thought but functions instead as one of the elements that helps to shape one's thought. Thus, the small correlation coefficients computed in this study indicated that proficiency in English partly contributed to undergraduates' ability to think critically.

The valuable contribution that language proficiency may make to the undergraduates' critical thinking ability is further reinforced by the results produced through the one-way analysis of variance (ANOVA) procedure which showed that students of the highest English proficiency level also obtained high scores on the CCTT. The actual difference in the mean scores of the four proficiency groups (i.e., eta square =.10) was approaching Cohen's (1988) large effect size coefficient (eta square = .14) indicating a rather substantial practical importance of the difference between the most proficient group and the other three less proficient ones.

IMPLICATIONS & CONCLUSION

The findings of the present study imply that more work needs to be done towards upgrading the standard of English language and critical thinking ability among UUM undergraduates. The observed facts that the undergraduates did not have critical thinking ability level equivalent to that of their western counterparts and that the majority of them were not highly proficient in English are consistent with the findings of a study done on Malaysian undergraduates studying in Australia (Jones et al., 1999). The study revealed that Malaysian students had problems coping with their studies in Australia not only because they had poor critical thinking skills but also due to the fact that their English language skills were poor and that they relied heavily on rote-learning, which Pugh and Fenelon (as cited in Moore, 1995) claim to be the kind of learning style developed through one's experience studying under the Malaysian educational system. If Malaysian undergraduates are still merely rote learners who have poor English language skills in spite of the initiatives taken by the Malaysian Ministry of Higher Education to upgrade the standard of English at the university, include critical thinking in the curriculum and promote assessments with emphasis on higher order thinking, the country's future is then at risk – Malaysia will lack competitive edge if its workforce does not have the skills and ability to take up the challenges of the information era.

Therefore, the Malaysian university should play its role well. To sustain its present role as the most important 'producer' of human capital, which is a valuable asset to the country, the university must dare take the challenges of bringing about drastic or real changes that will eventually improve the standard of English among the undergraduates and enhance their critical thinking ability. More serious attempts should be made towards creating an educational system that promotes life-long learning; that is, a system which will generate graduates who can flexibly meet the demands of the global job market. To establish such a system, the university authority needs to re-evaluate the effectiveness of the present curriculum and teaching practice, particularly, those pertaining to the teaching and learning of English and development of critical thinking. Any initiatives taken towards realizing the aforementioned educational system will also serve as preparatory efforts taken to accommodate the needs of future undergraduates, especially the first batch of students learning Science and Mathematics at schools in English who will enrol in their first year of study at the university by the year 2010. This group of students will be exposed to the learning demands similar to that of their western counterparts because they will have to learn all science and Mathematics related subjects at the university completely in English. If these students are critical in their thinking and proficient in English, they will be at par with their western counterparts and will later be able to make substantial contribution to the nation when they become part of the human resource; that is, they will be the graduates who will help Malaysia meet the challenges of the 21st century, sustain her economic prosperity and realize her goal to become a developed nation by the year 2020.

The findings of the present study should never be taken as conclusive. This study only investigated the relationship between critical thinking ability and prior second language proficiency of UUM undergraduates. Future research should focus on measuring both critical thinking ability and actual language proficiency of undergraduates at other Malaysian universities so that better comparisons and generalizations can be made. This will require the use of a general proficiency test that is different from the tests employed in this study. A replication and extension of this study, particularly involving longitudinal data and the use of a sophisticated multivariate procedure like Structural Equation Modeling is needed to provide more evidence on the relationship between the two main variables examined in the present study.

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Community Engagement for Sustainability: An Invitation and a Challenge to All Universities

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ABSTRACT

Universities are responding impressively to the challenges associated with global warming and to the urgent need for sustainable use of the world's finite resources. This paper reviews a selection of sustainable development initiatives already taken by universities in North America and Europe and suggests that while many universities are committing themselves to sustainability goals, greater emphasis could be given to the several ways of sharing these goals with the local community; to ways of engaging the community in the process of sustainable development; to ways of empowering universities through various forms of community engagement.

Engagement for sustainability and collaboration for sustainability are promoted in this paper as campus - community responsibilities. A community project in the province of Phayao, Thailand for example, illustrates possible avenues of collaboration and engagement. And research projects completed or in progress by individuals and small staff teams from Rajabhat Universities in Thailand demonstrate some of the opportunities already taken to enhance engagement for sustainability. Finally, the paper illustrates how the Rajabhat Universities and Boromarajonani Colleges of Nursing are responding to a mandate from the King of Thailand to contribute sustainably to the local community.

INTRODUCTION

The UNESCO decade "Education for Sustainable Development", 2005 – 2014, has stimulated an array of initiatives world-wide, the university sector being no exception. The Graz Declaration (2005) committed universities to sustainability goals and called on universities world-wide to "give sustainable development fundamental status" and more specifically, direct attention to learning and teaching, research and to "external social responsibility". In Thailand, Graz has special significance, given the strong support there for the Sufficiency Economy advocated by His Majesty the King and evidenced in many locations particularly in the north and north-east of the country (see for example, UNDP, 2008). Moreover, in Thailand an impressive number of conferences have been held, each highlighting further examples of sustainable development by universities. In November 2007 at BSRU for example, an international conference entitled "Innovation for Sustainable Development" attracted a wide range of papers and encouraged delegates to 'think globally and act locally' to achieve sustainability. This was followed in December with the 11th UNESCO-APEID conference in Bangkok entitled "Reinventing Higher Education". Again, the theme was 'sustainability'. Then in January, 2008 the second "Technology and Innovation for Sustainable Development" conference was held at Khon Kaen University. Now, in November 2008 at this fourth EDUCOM conference in Khon Kaen we focus, quite fittingly, on sustainability.

Conference presentations not least offer delegates practical achievements of universities and other organisations in the name of sustainability. As the Graz Declaration foreshadowed, universities can promote sustainability through the curriculum, through a wide range of research initiatives and through close contact with the university hinterland. Yet the underlying complexities of the term and its hidden imperatives are seldom explicated.

DEFINING SUSTAINABILITY FOR UNIVERSITIES

From a university perspective, what is sustainable development and its close synonym, sustainability? Frequently the term is defined in the words of the Brundtland Report first published over 20 years ago:

> Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (WCED Report, 1987, p87)

But how do we interpret 'the needs of the present' and how can we be sure that 'development' in this definition will not lead to the consumption of irreplaceable resources; fossil fuels and industrial minerals? Moreover, universities have a special role as facilitators of sustainable development; as centres of innovation, problem solving and technological change that take us into the realms of research and creative thinking. It follows that for universities a re-phrased Bruntland definition would be more appropriate not only reflecting Graz, but also emphasising an enhanced role for universities as innovators for sustainable development:

The development and use of new ideas, methods and products to achieve sustainable development, to promote the creative development and implementation of integrated and sustainability actions in relation to the three major university functions, learning and teaching, research, and internal and external social responsibility, these together to advantage future generations and their environments.

Graz commits universities to practise productive change through teaching, research and indeed the total functioning of the organisation without disadvantaging future generations and their several environments. But there is a tendency in the literature to focus more on the internal functions of each university and give rather less emphasis to community engagement for sustainability.

The United Nations and its various agencies have defined sustainable development as a community imperative through the metaphor of four interlocking pillars of sustainability: the natural, economic, social and political dimensions, matched by conservation, appropriate development, peace, equality and human rights and democracy (Figure 1). There is no attempt in Figure 1 to obfuscate or to diminish the complexities of sustainability. Rather, we are invited to assume that all areas of knowledge and all corners of human experience are relevant. And further, as in the diagram, all areas and all corners of knowledge and experience are inter-connected.

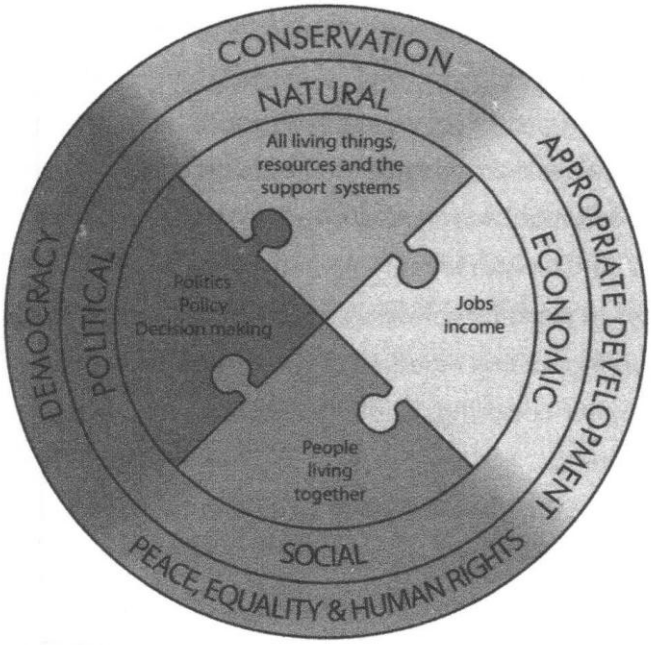

Figure 1: Defining Sustainability. Four interlocking pillars

UNIVERSITY POLICY AND PRACTICE: SELECTED JOURNAL ARTICLES

Publications targeting university sustainable development policy and practice. From 2000, two striking findings emerge from journal literature: 1. very few refereed articles directed at SD policy and practice have been published and 2. the papers selected here reflect a desire for substantial change in universities to accommodate sustainability more effectively. In short, it is a given that full and adequate implementation of sustainable development policies and practices will require substantial changes in all universities.

Janet Moore, 2005. In a pivotal paper, Janet Moore proposed seven recommendations for universities wishing to enhance sustainability both in the classroom and in other daily activities. (Moore, 2005) All seven had been honed from a sequence of workshops and consultations at UBC in a process labelled 'value focused thinking' and from dialogue with 'a large number of stakeholders' (Figure 2). The seven avenues for change were clearly built on the assumption that the university is itself an interactive community and to achieve sustainability, collaboration across all sectors will be expected. That is to say, reaching solutions to sustainability problems demands inter-disciplinary thinking and integration of all relevant university activities. Interestingly, Moore gave little attention to the community outside the university, the university hinterland, presuming perhaps that a refocused university would necessarily interact productively with its hinterland. She re-defined sustainability for universities by 'infusing' sustainability in all decision making, by promoting and practising collaboration, by cross discipline problem solving and by emphasising personal and social sustainability in the university community especially amongst university staff. She also emphasised 'pedagogical transformation' to ensure delivery of sustainable development content, values and problem solving for sustainability to all students.

1. **Infuse sustainability in all decisions**
2. **Promote and practice collaboration**
3. **Promote and practice transdisciplinarity**
4. **Focus on personal and social sustainability**
5. **Integrate planning, decision making and evaluation**

6. Integrate research, service and teaching

7. Create space for pedagogical transformation

Figure 2: Seven recommendations for creating sustainability at the university level. Adapted from Moore, 2005.

Embedded, but largely silent in Moore's recommendations is the notion of engagement of the university with its community. Universities are important community entities each closely tied to its immediate neighbourhood. Just as it is difficult to envisage a university without students, so it is with a university divorced from its local community. In its symbiotic relationship with the community each university provides employment opportunities and other forms of economic and social stimulus which in turn enable it to function as a productive teaching and research entity, a platform and a stimulus for sustainable development.

Rebeka Lukman and Peter Glavic, 2007. More recently, Lukman and Glavic (2007) endeavoured to solve a fundamental question: 'What are the key elements of a sustainable university?' They recognised the importance of engagement, noting that 'universities are acting as agents in promoting (sustainability) principles within society' and quoting Cortese (1992) agreed that 'universities bear profound responsibilities for increasing awareness, knowledge, technology and tools to create an environmentally sustainable future'.

But universities are pulled in opposing directions. On one hand is the search for and acknowledgement of environmental laws and priorities and on the other, the achievement of social and economic advancement for communities through research, innovation and technological development. Somehow, these opposing directions need to be reconciled. It follows that education for sustainable development should reflect the vision, mission and goals of the university as a sustainable organisation (Cortese, 2003). To achieve sustainability goals, a 'sustainability office has to be established' to coordinate and communicate best sustainable education practice across all sectors of the university. A 'sustainability council' with membership from within and beyond the university will strengthen the office both within the university and its hinterland. Lukman and Glavic claimed that implementation of these practices at the University of Maribor in Slovenia, supported by the Student Council, was beginning to effect positive change.

H. V. Weenen, 2000. In his article published in the International Journal of Sustainability in Higher Education, Weenen (2000) claimed that 'sustainable development is the biggest challenge to universities in the twenty-first century'. He documented some of the divergent practices employed by universities seeking to integrate sustainability into their activities, and claimed that 'inevitably management, research, education, communication and operation of any university with a genuine interest in sustainable development will have to change'. Weenen's paper highlights the importance of ecological education and ecological experience as underpinnings to an appreciation of sustainability. Finally, he argued that sustainable development must accommodate four L I F E principles (Figure 3).

Limits in our use of resources and through conservation a new commitment to quality of life
Interdependence. Recognition of ecological balance and natural processes; and integration of production processes with the surrounding ecosystem
Fundamentals. Sustainable development must become a prime objective. We must target depletion
Equity between industrialised countries and developing countries

Figure 3: Weenen's L I F E Principles

COMMUNITY ENGAGEMENT FOR SUSTAINABILITY

As has already been noted, Graz recommended that universities examine ways of practising 'external social responsibility' calling for 'closer interaction with other stakeholders in communities to better respond to their needs and requirements': a call for engagement between university and community generating a close productive linkage mutually beneficial to both parties. Productive engagement for sustainability will occur within or between universities. And increasingly, universities will be exploring and promoting sustainability projects with the local community, perhaps by collaborating with community industries, NGOs, local and provincial governments, or with non-formal groups - farmers, fishermen, doctors. In this regard, universities may give priority to community sustainability by funding doctoral research. Engagement will also be achieved when students take new ideas and technologies promoted and practised in the university to the wider community. It also follows that local community members may effect change in the university through various forms of engagement, for example by serving as community representatives on university advisory committees.

These and similar linkages have potential to enhance sustainability for the university. All of us at this conference will recall situations of university engagement with the community that benefited both parties. How did they happen? What were the motives? What encouragement was needed? Answers to these questions will perhaps reveal no prominent rationale for sustainability. But with leadership directed towards sustainable development and a university priority favouring community engagement, substantial changes could emerge, changes benefiting both university and its local community.

In a keynote address at the Innovation for Sustainable Development conference held at Bansomdejchaopraya Rajabhat University, four dimensions of sustainability were recognised (Renner, 2007). By explicating each of the four dimensions we arrive at sixteen opportunities for community engagement (Figure 4) and no doubt further examples could be added, a useful checklist for university researchers and planners; particularly those engaged in the practice of community sustainability. Given that the four dimensions target in turn the questions of what, how, why and rationale, an item from each dimension could comprise a sustainability package for community engagement.

Dimensions of Sustainability

1. **Care and concern for the environment**
   - **Responding to a diminishing of natural resources**
   - **Controlling pollution**
   - **Supporting ecosystem management**
   - **Encouraging environmental protection**

2. **Partnership and collaboration to achieve sustainability**
   - **Working in teams**
   - **Planning for long-term development**
   - **Committing to environmental goals**
   - **Building on achievements**
   - **Sharing and communicating SD to others**

3. **Stewardship for sustainability**
   - **Avoiding waste**
   - **Recycling and re-use of materials**
   - **Using clean technologies for production**
   - **Monitoring any degrading of the local environment**

4. **Management to achieve sustainability**
   - **Searching for 'clean' solutions to environmental problems**

- **Using multidisciplinary approaches including environmental management strategies**
- **Managing for community long-term benefit**

Figure 4: Dimensions of Sustainability (adapted from Renner, 2007)

THREE AVENUES FOR COMMUNITY ENGAGEMENT BY UNIVERSITIES IN THAILAND

It is now pertinent to give some practical substance to the theoretical models described in this paper, using examples of sustainability-in-action, targeting some of the opportunities available to universities. What follows is but a small sample taken from a wide range of projects already completed or current in Thailand, demonstrating the importance of engagement by universities with the local community.

1. Sustainable Agriculture Project in Phayao, Thailand

Phayao is about 700 Kilometres north of Bangkok, a province surrounded by mountains and within easy access of Chiang Rai. It is a small province (6335 square kilometres) with a rich history and considerable agricultural potential. Unfortunately, exploitative practices by land owners and land lords have not only severely diminished the mountain forests, but have led many farmers into chronic debt. In extreme cases, farmers have been driven off the land and their families forced to migrate to substandard environments. Problems of poverty and crime have led NGOs in Phayao to search for solutions. What follows briefly documents a community project designed to address an entrenched agricultural problem addressed through an agricultural sustainability project involving local government, two NGOs and strong support from the local population. Here it seems is a project well suited to university engagement for sustainability.

Phayao Project Phase 1. Sustainable agriculture through value adding, 2005 – 2008.
(Tambon Ban Tham, Tambon Ban Pin, Tambon Nong Lom)

The task here was to develop food and herb processing for local and national markets to avoid wastage of farm products during the harvest seasons and to enable these processed products to be available throughout the year. In previous years, leftover fresh products were thrown away after daily selling. By providing equipment for food processing and preserving new sustainable markets could be created. Further, success with existing products would lead to diversification of farming and to collection of a wider range of forest foods for processing and marketing.

Items purchased:

One large refrigerator
Five solar driers
Stainless steel shelving
One bakery oven
Four stainless steel tables
Four electric fans
Kitchen utensils
One powder mixer
Two compressing sausage machines

Equally important has been the training of village teams to prepare marketable products:

Training on the production of herbal shampoo and dish cleanser
Training on the processing of local fruits to dried fruits (longan, banana, Mango)
Training on making of fruit juice (lychee, longan)
Training on the making of drinks for health (lemongrass, tamarind, Passion fruit)
Training for making crispies (pumpkin, sweet corn)
Training for making Thai sweets and jams

Training on the processing of local food products (pork skin, sausage, Bamboo shoot)

In addition:

Training for proper packaging and marketing
Training on cooperative management
Training for methods of sustainable agriculture
Leadership training

This exercise in innovative management has been active for three years. It will now continue to function without any further project funding. Innovative management skills covering village teams from ten villages have been successfully implemented. Farm products, once strictly seasonal, are now available year round. Farmers have now seen the significance of producing a wider range of products and agricultural diversification is expected to continue (Final Report, 2005).

Phayao Project Phase 2. Sustainable agriculture through dependable water supplies, 2009 - 2010. Farmlands in Tambon Ban Tham, Tambon Ban Pin, Tambon Nong Lom and Charoensap Village (42 families) Note: same tambon as for Phase 1.

Project planning has begun for water resource provision and management to ensure that agricultural production can continue through the dry season and the villagers in Charoensap Village will have sufficient and regular safe water. The intention is in 2009, to conduct workshops covering water resource management for each tambon and the importance of regarding water as a shared environmental resource. Also, to implement the construction of a highland waterworks system in Tambon Nong Lom and to construct reservoirs and smaller water ponds and water tanks near groups of farms to ensure adequate supplies of irrigation water in the dry season (Project Proposal, 2007).

Already, the three tambon have become models of innovation for sustainable development (refer to Phase 1). Neighbouring tambon in Phayao are learning from this pilot project and are looking for ways of avoiding total dependence on seasonal rain. A dry season can be as long as eight months and a succession of dry seasons can impose severe hardship, both on farmers and villagers.

2. Training Programs for Thai Nurses in Mental Health Nursing and HIV/AIDS Prevention and Holistic Care.

An excellent example of engagement for sustainability involving higher education and the community is a capacity building project in Thailand for Mental Health and HIV/Aids Prevention and Holistic Care. In partnership with the Thai Ministry of Public Health, Colleges of Nursing, Tertiary hospitals and local communities, Edith Cowan University supported the development, implementation and delivery of two training programs during 2006-2007 for 32 Thai nurse educators in Mental Health Nursing and HIV/AIDS prevention and holistic care for people living with HIV/AIDS. This project received funding support from an AusAID Public Sector Linkages Program Grant, Edith Cowan University (ECU) and the Thai Ministry of Public Health.

The project involved the development of curricula as well as training of Thai nurse educators in both Australia and Thailand in order to increase nursing knowledge and skills as broadly as possible across Thailand. While the ECU staff facilitated and assisted in the development, the Thai Nurse Educators were actively involved in the curriculum design and planning for future courses. An outcome of the program was the development of a sustainable training centre in Thailand and the development of training courses which were accredited by the Nursing Council of Thailand for 5 years. Training programs are now being delivered by the Thai Nurse Educators starting in 2007 for nurses throughout Thailand and surrounding countries. This project initiated through engagement and collaboration, with financial support from Thai and Australian Government, has resulted in long term improvements to nursing practice throughout Thailand with direct benefit to the local communities.(Public Sector Linkages Program: Activity Completion Report,2007)

3. Engagement for Sustainability by the Rajabhat Universities

The Rajabhat Universities in Thailand have been given a mandate to provide educational programs at all degree levels with a focus on service to the local community. While the universities have their grounding in teacher education and training they have now diversified to offer degree programs from bachelor to doctoral level in disciplines such as education, science and technology, agriculture and industry, industrial arts, humanities, social sciences and management science across the country and even in surrounding countries. In addition, the Rajabhat Universities provide a comprehensive range of pre and in-service training programs to meet the needs of the professional workforce and the general public and conduct research related to rural development and sustainability. In order to achieve this, there has over the last 10 years a focus on upgrading of skills of the Rajabhat staff and the development of a strong applied research culture. ECU along with other Australian universities has been working in partnership with the Rajabhat universities to provide research development of staff. A case study of a successful research preparation program is provided by Cross and Wuthisen based on a model of empowering staff to undertake applied staff for sustainability within the local community. (Cross 2002).

Key elements to the model include the engagement of Rajabhat staff with the local community to identify suitable research topics and to gain local knowledge. As outputs of the applied research, Rajabhat staff not only disseminate their findings to the global community but work closely with the local community for sustainable change and improvement. Given the nature of the research there is a focus on an interdisciplinary approach which was reflected by the research preparation programs delivered by ECU. Rajabhat staff from across academic disciplines worked and shared their ideas and expertise to clarify the research problem and suitable approaches for undertaking the research. Over a period of 10 years more than 300 Rajabhat staff and staff from other educational institutions have completed the research preparation program leading to a wealth of research variously benefiting local communities. Many of the staff have now completed their Doctoral studies and are now in the process of engaging their communities for capacity building and sustainable change.

Examples of doctoral projects by Thai Rajabhat staff that have resulted in community engagement for sustainability include the following:

- The Development of a Community Information Database System in the Northeast of Thailand: Community Empowerment through Community Learning Centres. – Dr Chumnong Wongchachom.
- Effectiveness of Freshwater Protected Areas for the management and sustainability of artisanal fisheries and biodiversity in freshwater ecosystem in South East Asia. – Dr Chongdee Srinoparatwatana.
- Water Conservation Behaviours of Families on the Bangpakong River Bank – Dr Kuakul Sathapornvajana
- Effectiveness of Parental Training on Parenting in Chachoengsao Thailand – Dr Anchalee Tunsiri.
- Development of Sustainable Tourism by Diminishing Environmental Impact – Dr Attama Boonpalit.
- Biotechnology of Soil Algae and Soil Conditioning – Dr Sumitra Moopayak

All of the above and many other Rajabhat University research projects target an environmental, sustainable or community problem and have involved close contact with individuals and community groups all of whom have assisted with the examination and dissection of the problem and the implementation of outcomes of the research. Thus, through engagement, universities have strengthened their links with the local community and have brought the community closer to the university.

As an example Dr Chumnong Wongchachom completed his Doctor of Philosophy dissertation in 2006 from ECU in Western Australia. (Wongchachom 2006). Through questionnaire and interview of local experts in Thailand he identified the information needs and local knowledge for the Impeng Community Network in Thailand. Data obtained was analysed and classified into retrievable forms of knowledge. He then developed, trialled and installed a model community information database system (CIDS). Following further evaluation and feedback from the community CIDS was further refined and implemented to the wider community. Feedback indicates that CIDS has enhanced community development and empowerment through effective problem solving for sustainable development.

CONCLUDING COMMENT

This paper has focussed on three significant challenges currently facing all universities. The first is to articulate and give practical substance to the UNESCO decade of education for sustainable development and the associated Graz Declaration by rethinking university priorities. The second is to foster stronger partnerships with local community groups in response to local community needs. And thirdly, the challenge is to enhance at a practical level, sustainability projects with the local community.

These challenges should not be minimised or taken lightly. When addressing the challenge of implementing the UN Millennium Development Goals, retiring UN Secretary-General Kofi Annan offered this comment: 'We cannot win overnight. Success will require sustained action across the entire decade - - - - - so we must start now'. So it is with universities and sustainable development: an opportunity and a challenge for us to use our resources, our skills and our talent, to engage even more with our communities. Our experience in Thailand, supported in this paper by specific achievements of individuals and university teams, confirms that partnership with the community can be challenging and rewarding for both the university and its local community. The opportunity is now for productive change signalling greater community engagement for sustainability.

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Moving Beyond National Borders: Globalization, Higher Education, and International Politics

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ABSTRACT

Globalization has at least four far reaching implications for higher education. First is the constriction of monies available for discretionary activities, such as post secondary education. Second is the growing importance of techno science and fields closely involved with the markets, particularly the international markets? Third is the tightening relationship between multinational corporations and state agencies concerned with product development and innovations. Fourth is the increased focus of multinationals and established industrial countries on global intellectual property strategies. This paper argues interconnections among globalization, higher education and international politics, their different impacts and implications. In this paper the author offers a brief literature review about globalization and its impact on higher education. We argue that cultural institutions in general and higher education in particular, reproduce the dynamic of the social system in which they are embedded. The paper illustrates the phenomenon by which the higher education and its policies have been shifting toward the globalization model. It focuses on higher education as a non-political factor paving the way for mutual understanding and collaboration in international environments.

INTRODUCTION

The modern university exists and functions in an environment characterized by economic interconnectedness, political democracy, market economy, consumerism, restructuring in various domains, flat administrative structures in organizations, global ecological issues, emerging global multiculturalism values, and global interconnectedness via the information technologies, particularly the internet. Universities, which are essentially knowledge providers, can no longer function as cottage industries in such environment. Given the ubiquity of digital and information technology, they will become more learned-centered than faculty-centered. Like business, they will have to evolve into multinational consortia and from partnership in a number of creative ways among themselves and with various kinds of enterprises that were not traditionally linked directly to higher education. Since globalization will not disappear but will continue to predominate, the opportunities that it offers must be seized by higher education. (Stigliz, Joseph E., 2002)

Different broad environmental factors that impact on universities regardless of their physical location, tradition, current practices, or aspirations are proposed. The first of these factors is the fact of economic interconnectedness among nations. The economy of every country is impacted, if not linked, with those of countries surrounding it and around the world. The most dramatic illustration of this fact is the proliferation of multinational corporations, the loyalty of which is tied to shareholders, not nations and their economic impact is transnational. The Second environmental factor is the world shift toward democracy and especially, toward market mechanisms as opposed to command and control economic structures. Without going into an analysis of complex development, political systems of representative democracy are today more widespread than was the case twenty or thirty years ago. (Tyler, T.R., 2002, 195-207).

The Third environmental factor is the emergence of consumerism. There is a trend toward serving consumer needs and interests, whether in economic products or in governmental services to its citizens. The operative philosophy is that the individual comes first. If his or her needs are not served there will be political or economic repercussions against providers who do not provide-who fail to serve their customers. Fourth, there is a significant restructuring in the world of both national and also international organizations and governmental system. This restructuring fits in with the general shift toward market mechanisms, consumerism and the spread of democratic systems. It is characterized by decentralization. (Hayward Fred, 2002, 44-47)

Fifth, within organizations there is a clear trend to flatter, as opposed to hierarchical, organizational structures, joined with the breaking down of disciplinary lines. The idea is to give individuals and small groups more independence and discretion to further the missions of their organizations. Small groups within large organizations are increasingly encouraged to work across disciplinary and organizational lines on the grounds that doing so is less bureaucratic and more efficient. The sixth new context for universities includes the physical and biological environment, that is, global ecological issues. This issues leap over national lines, but also across university disciplinary lines, Such as the pollution of the air and water, the deforestation of the life-sustaining areas of the planet, and the complex issues of global warming. (Psacharopoulos, George, 1977, 69-90)

The seventh is the emergence of global multicultural values. Many parts of the world are full of ethnic and racial tensions and fragmentation, but there is also a countervailing trend: a deeper appreciation for the richness represented by the various ethnic groups, multicultural sports industry, represented by soccer, basketball, ice hockey and track and field that cuts across national lines. The eighth and final environmental change in many ways mixes the others; it is perhaps the most significant factor being faced: the Digital Age characterized by the internet and the World Wide Web. Technology and the new information systems will not replace human interaction, but everyone id now, like it or not, globally interconnected. The information technologies are revolutionizing how market products are produced, how ideas are exchanged, and how people simply communicate. If these information technologies are not recognize and exploited, the universities of the world, older and newer, larger and smaller, will be marginalized through the impact of now providers of information.

ENVIRONMENTAL CHANGES AND UNIVERSITIES: IMPACTS AND IMPLICATIONS

These major contextual changes, and particularly the digital and information technologies, are fundamentally affecting universities all over the world. There is a huge impact on how they perform their responsibilities for discovering knowledge (research), transferring it to all who can profit from and use it (learning and teaching), and applying it through their outreach and engagement with the communities and social and economic interests that public universities, especially, are intended to serve. All universities of the world are going to be vastly changed; indeed, they must lead that change in the new digital and information technology age. (Kyoto Wachira, November 02, 2007)

The modern university as a project of the nation state and its cultural identity, find itself in a complicated and indeed delicate situation at the moment, but what is clear is that nowadays, universities are highly involved in literally every kind of social and economic activity in our increasingly dynamic societies.(Clark, Burton R.2003, 65-67)

A review of the complex and dynamic processes of internationalization at different levels in higher education reveals that these processes are prompting increasingly rapid change in two rather different aspects. First, there is now a wide range of border crossing activities, many of them resulting from institutional rather than governmental initiatives, and these are certainly still on the rise. We can also see more substantial changes towards systematic national or supra- national policies, combined with a growing awareness of issues of international cooperation and competition in a globalizing higher education market. (Muller J, Cloete, N. and Badat, S., 2001, 33-45)

The contemporary university was born of the nation- state, their regulatory and funding context was, and still is, national; their contribution to national cultures was and still is, significant; students tended to be, and still are, trained to become national functionaries; universities are thus object as well as subject of "internationalization" or "globalization". They are affected by and at the same time influence these processes. (TFHES, 2005, 97-99)

HIGHER EDUCATION AND DEVELOPMENT

There is evidence of the devastation of globalization on developing countries as the poverty gap has increased despite the fact that globalization was meant to benefit all members of the global community. Countries of the North with their competitive advantage compete with countries from the South, for best students, Faculty, administrators and researchers. As a result the intellectual resources from the South are being drained in the process.

Countries from the South are at risk of being further marginalized if their higher education institutions fail to participate in the knowledge production networks and activities that would make them relevant and more responsive to needs of a new economy.(Tilak J.B.G.,2004, 227-39)

In the globalizing economy higher education has featured on the WTO agenda, not for its contribution to development but more as a service to trade in or a commodity for boosting income for countries that have the ability to trade in this area and export their higher education programs. The world Bank report on higher education presents an argument for the indirect role that higher education can play in development, and in poverty reduction. Three key arguments are presented in the report. The first argument is that higher education can contribute to economic growth by supplying the necessary human recourses for a knowledge driven economy, by generating knowledge, and by promoting access and use of knowledge. The second argument is that higher education has the potential to increase access to education and in turn increasing the employability of those who have the skills for a knowledge driven economy. The third argument is that higher education could play a role in supporting basic and secondary education by supplying those sub-sectors with trained personnel and contributing to the development of the curriculum.(Jimenez, E.,2007, 22-29)

Changes taking place have put a lot of emphasis on the need for accountability to society beyond financial accountability, demand for intellectual leadership, and partnership that could contribute to development. We should be clear and unequivocal in the reasons why poverty cannot be overcome without the benefits of higher education while we get on with the work of building stable, high quality higher education systems in all countries.(McKenna, K. Y. Green, A.S., 2002, 9-31).

Higher education and poverty are linked because modern societies can become or remain materially wealthy only if they are managed by a large group of individuals with the right mix of sophisticated technical and organizational expertise. Lessons over the last decades of development assistance point to the critical role of capacity enhancement in promoting sustainable development. At the heart of capacity enhancement is the importance of intellectual capacity in analyzing national development challenges. Research on the benefits of higher education confirms its ability to influence people's skills and behaviours in ways that facilitate the transformation to the more knowledge-rich, flexible, adaptable forms of social organization associated with prosperity. Private education has grown, essentially to meet excess demand and differentiated demand for higher education. First, the social demand for higher education exceeds the public supply, and the private market seeks to meet the unsatisfied demand. Secondly, demand for different quality (presumably high quality) and content in education (such as, for example, religious education) also contributes to the growth of privatization.

The case for privatization of higher education exists mostly on the basis of financial considerations. Public budgets for higher education are at best stagnant, and are indeed declining in real terms, more particularly in relation to other sectors of the economy. Privatization is also favoured on the grounds that it would provide enhanced levels of internal and external efficiency of higher education, and higher quality of education; and as the private sector would have to compete with the public sector, the competition would result in improvement in quality and efficiency not only of private education but also even public higher education. In the long run, due to economies of scale, private institutions provide better quality education at lower cost than public institutions, as in Japan. (Castells, Manuel, 2004, pp. 14-40)

On the other hand, privatization is opposed on at least three sets of reasons. The existing market system does not ensure optimum social investment in higher education, as externalities exist in the case of higher education, which is a ' quasi-public good'. The market system also fails to keep consumers well informed of the costs and benefits of higher education. It is likely that the costs of private education is much higher than public education as in the United States and the Republic of Korea. Finally, a private system of higher education is also insensitive to distributional considerations, and in fact contributes to socio-economic inequalities. Accordingly, public education is not only superior to private education, but private institutions cannot even survive without state support (Dovidio, J. Kawskamai, K., Johnson, 2007 33, 510-540)

One of the most common myths is that there is huge demand for private higher education, as private education is qualitatively superior to public education. But the available evidence shows that the higher quality of private education compared with public higher education is exaggerated. (Wood, W., 2000, 539-570)

It is also argued that as the private sector has to compete with the public sector, the efficiency of the former and, equally important, the efficiency of all higher education, including public, improve significantly. But in countries where mass private sectors prevail, or in countries where private sectors play a peripheral role, there is little scope for competition, and as a result, the private sector may turn out to be very inefficient, and even economically corrupt.

Secondly, it is widely believed that graduates from private universities receive higher rewards in the labour market in the form of lower unemployment rates, better paid jobs and consequently higher earnings, but the empirical evidence does not support these assumptions. Unemployment rates among graduates from private universities are generally higher than those from public universities in many developing countries. (Castells, Manuel, 2006, 34)

Some argue that private institutions provide considerable relief from financial burden to the governments, as they are self-financing. But as well known, most private institutions are not totally private, at least from a financial standpoint, they receive huge subsidies from the state.

Thirdly, it is felt that the private sector responds to the economic needs of the individual and society, and provides relevant types of education. In most countries, private higher education institutions offer mainly low capital-intense disciplines of study.

It is also claimed that private higher education can improve equity in education, by providing access to many more students, who, otherwise, would not have gone to higher education. It is important to note that private universities are created mainly to protect the 'elitist' character of education, and to keep the masses away from higher education.(Bargh, J. A. 2002, 1-8)

Some argue that privatization of higher education improves income distribution, as public funding of higher education, with all its 'perverse effects' is generally found to be regressive. Again, systematic research has shown that it is not true.

The goals and strategies of the private sector in higher education are on the whole highly injurious to the public interest. First, the private sector has turned the 'non-profit sector' into a high-profit-making sector not only in terms of social and political power, but also in terms of financial returns, and as profits are not allowed in educational enterprises in several countries, private educational enterprises have resorted to illegal activities in education. (Tilak, Jandhyala B.G., 2002, 33-36)

Fourthly, by concentrating on profit-yielding, cheap, career-related commercial studies, the market-oriented private universities provide vocational training under the name of 'higher education' and ignore 'broader higher education'. Private universities also totally ignore research, which is essential for sustained development of higher education.

Finally, by charging high fees, private institutions create irreparable socio-economic inequities between the poor and rich income groups of the population. Private education is 'socially and economically divisive.

CONCLUSION

Universities are many things, they are especially knowledge providers, but today, they increasingly face enormous competition from other providers of knowledge. Education will no longer be neatly segmented and synchronous but, instead, asynchronous and presented in new ways.

This new situation requires, among other things, that the best, strongest, and most vital universities be those that form partnership with businesses, with governmental and private agencies, and above all with one another. The great resource that universities have is their ability to discover knowledge, but the knowledge so-discovered must be harnessed and delivered so as to serve the economic and social needs of societies.

Higher education is an important from of investment in human capital development. In fact, it can be regarded as a high level or a specialized form of human capital, contribution of which to economic growth is very significant, higher education systems in many developing as well as developed countries are characterized with a crisis, rather a continuing crisis, with overcrowding, inadequate staffing, deteriorating standards and quality, poor physical facilities, insufficient equipment, and declining public budgets. Moreover importantly, higher education is subject to neglect and even discrimination in public policy. The neglect also followed a general presumption supported by thin empirical evidence that higher education has no economic growth, equity, poverty reduction and social indicators of development in developing countries. The role of the state is very important in providing and financing education everywhere. Excessive reliance of the governments on private sector for the development of higher education may lead to strengthening and even producing new inequalities, besides adding to the problem of quality. On the whole, it seems that initial government investments on a large scale are important in higher education; but only after some time, and certain level of educational and economic development is achieved, private sector may or can complement the state efforts in higher education.

Comparing the experiences of several countries, one may conclude that these policies succeeded only in those countries that have invested heavily in education, including specifically higher education.

The issue is not one of whether or not these trends and developments will continue; they will. The issue is whether or not universities, be they in Asia, Russia, Europe, or the United States, will adapt and change and lead in their notational systems. And that will not happen unless there are men and women with vision and willingness to lead.

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Fostering Students' Self Assessment Skills for Sustainable Learning

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INTRODUCTION

Enhancing academic quality and the employability of graduates are among the most frequently mentioned driving forces behind global higher education improvement initiatives for the past two decades (Garfield 1994; Gibbs 1999; Harvey and Green 1994; Reichart and Tauch 2003; Edwards 1997). This has contributed to shifts in teaching, learning and assessment practices to enhance students' academic competencies and generic attributes as compatible goals of higher education and employers. Consequently the role of assessment of student learning in higher education is continually being broadened to contribute to sustainable learning.

Sustainable assessment, in Boud's (2000) words refers to 'the knowledge, skills and predispositions that underpin lifelong learning activities' (p. 151). Moreover, sustainable assessment is akin to sustainable development , in that it is aimed at 'meet[ing] the needs of the present without compromising the ability of . . . ' (World Commission of Environment and Development 1987), 'students to meet their own future learning needs' (cited in Boud 2000, p. 151). Notwithstanding the general role of assessment for certification purposes, assessment can also be used to build students' capacities for lifelong learning. To achieve this goal, it is necessary to prepare students to undertake assessment of their own learning and performance. This will enable students to not only contribute to their own learning in the immediate situation, but also to their own and others' learning in future situations throughout life. Hence, sustainable assessment builds the skills needed for lifelong learning.

To address the goals of lifelong learning, burgeoning changes are occurring in learning, teaching and assessment. Such changes are reshaping academic goals to produce graduates who have the capacity to function successfully in an era that demands adaptable, autonomous, self regulated individuals who are capable of analytical, critical and reflective thinking and problem solving with the ability to apply theoretical knowledge to solve real world problems; who are capable of leadership, teamwork and conflict management; and who can cooperate and communicate effectively with others upon entry into employment and beyond (Boud 2000; Birenbaum 1996; Dochy 2001; Dochy and McDowell 1997; Dochy et al. 1999; Falchikov and Boud 1989; Moerkeke 1996; Schon 1987). In particular, profound shifts in the conception and practice of assessment in higher education are occurring, for example an increased focus on the role of formative assessment to focus students' attention on the processes of assessment and to encourage them to instil such processes as part of the act of learning, rather than reinforce the notion that assessment is just something that they are subjected to by an external source. This is at the heart of sustainable assessment.

Self assessment provides a means of promoting the goals of lifelong learning. Boud (1995) defines self assessment as 'the involvement of students in identifying standards and/or criteria to apply to their work and making judgements about the extent to which they met these criteria and standards' (p. 5).

Hence, self assessment is seen as not only an effective tool for formative assessment of learning, but also as a critical life skill (Boud and Falchikov 1989) that is important at all levels of the curriculum. Moreover, Boud and McDonald (2003) surmise that since 'self assessment affects cognition, affection and conation' (p. 211), it can encourage deep as opposed to surface approaches to learning, with positive implications for the quality and sustainability of learning.

The purpose of this paper is to explore some of the issues involved in fostering self assessment skills to promote sustainable learning in students. The authors argue that by focusing students' attention on self assessment processes, lifelong learning is promoted as this not only builds students' capacity to judge the quality of their work against given criteria but also stimulates an improvement orientation. Moreover, self assessment processes once developed are sustainable beyond the immediate assessment task and therefore potentially influences student learning positively. Theoretical support for this argument is drawn from the literature on self assessment and lifelong learning, and practical significance is demonstrated by means of a case study investigation.

CONTEXT

The case discussed in this paper is situated within an Australian higher education setting. A formative self assessment strategy was adopted to promote the development of 'cognitive, meta-cognitive and social competencies and affective dispositions' (Dochy et al. 1999, p. 334) to promote sustainable learning. A written assessment task provided a cognitive challenge that created opportunities for students to demonstrate problem solving, critical thinking, questioning, searching for relevant information, making informed judgements, using information efficiently, analysing information, and communicating effectively in written form. To promote meta cognitive competencies, the learning process was grounded in self reflection and self evaluation. Social competency was limited to engagement by students in written reflective dialogue with the lecturer about their learning. Affective dispositions such as perseverance, internal motivation, responsibility, self management, self efficacy, and independent learning were recognised as important facets contributing to students' learning processes and assessment outcomes. Overall these dimensions reflected the desired graduate attributes embedded in the curriculum.

LITERATURE REVIEW

Existing literature is abundantly clear about the ways in which formative assessment contributes to the goals of sustainable, lifelong learning, and how these inform the axioms of sustainable assessment. However, there are many complexities surrounding competing purposes of assessment including challenges that emerge within particular learning environments.

Self Assessment and Learning Benefits

Self assessment in educational practice is reported to have demonstrated many benefits, for example, improvements in the quality of learning (i.e. produced higher grades) (Hassmen et al. 1996); reinforcement of students' awareness of their strengths and weaknesses in the subject knowledge, and enhanced ability to apply knowledge and effective learning strategies (McNamara and Deane 1995). Improvements in students' capacity for self awareness and the ability to monitor one's own learning and performance are invaluable benefits reported by some studies (for example Cassidy 2006; Falchikov and Boud 1990; Peters 2002; Reid 2001; Rivers 2001). Improved affective dispositions, such as enhanced self motivation (Norton 2004) and independent learning are further reported benefits (for example Cotton 2001; Peckham and Sutherland 2000; van Krayenoord and Paris 1997). Self assessment is also believed to have promoted student success and lifelong learning (McAlpine 2000).

Sustainable Assessment

An important axiom of lifelong learning is that people need to focus as much on the judgements they make about learning as on the learning tasks themselves. Since students in a university environment are being prepared largely for an increasingly unknowable future, Bowden and Marton (1997) argue that curricula need to focus on developing students' critical ability to discern variation in knowledge, so that they are able to perform effectively in new situations; implying that learning and assessment must be viewed in wider terms. To achieve this, it is reasoned that both formative and summative assessment practices must consider their effects on learning and learners (Boud 2000). However, Boud cautions that summative assessment 'acts as a mechanism of control exercised by guardians of particular kinds of knowledge' (e.g. teachers, educational institutions, professional bodies) 'over those who are controlled by assessment' (e.g. students, novices, junior employees) (p. 155). The problem with this is that it too easily locates 'responsibility for making judgements in the hands of others and undermines learners' ability to be effective through simultaneously distinguishing the criteria and standards of performance being upheld' (p. 155). But, 'insufficient attention has been given to those aspects of assessment that contribute most to students' ability to learn for themselves and thus contribute to a learning society' says Boud (p. 155). This makes a strong case for refocusing on the role formative assessment can play in what and how students learn.

Several axioms for sustainable learning may be drawn from Black and William's (1998) extensive review of the literature on formative assessment. Put simply, to foster sustainable learning, formative assessment must:

- Focus on learning rather than performance
- Build self assessment skills vital for lifelong learning
- Rest on a belief that all students' learning must be supported
- Make students aware that their beliefs about their own capacity as learners affects their outcomes
- Be aligned with teaching and learning practices
- Generate self improvement
- Separate feedback on learning from grading processes
- Utilise a criterion or standards- based framework
- Encourage reflective learning.

These principles suggest that suitable forms of formative assessment as well as 'ways of embedding formative assessment thinking into all acts of learning' are necessary to foster sustainable assessment (Boud 2000, p. 158). Assessment of learning by students themselves provides a strategy to promote ongoing learning. Hence self assessment that enables students with capacities to construct formative assessment schema, in other words, meta assessment competencies, provides a form of sustainable assessment. To foster sustainable learning, a self assessment strategy must include the following features according to Boud (2000):

- Build students' confidence that new learning tasks can be mastered
- Promote exploration of tasks and standards which apply to any given learning task
- Foster active engagement with learning tasks to test understanding and application
- Provide tools for self monitoring and judging progress
- Create opportunities for practice to identify critical aspects of problems and issues
- Provide feedback to influence further engagement with the task
- Demonstrate care in the use of language to prevent premature closure on ongoing learning.

These characteristics would suggest that sustainable assessment needs to be inextricably woven into the teaching and learning context and cannot be operationalised in an instrumental way. Importantly though, it is recognised that what is a sustainable learning activity in one situation or for one student

may not be for another. Therefore, whilst sustainability of assessment is informed by a set of general principles, its application must address the unique teaching and learning issues that characterise each context. Hence, an assessment task cannot be judged as contributing to sustainable learning simply on the basis of the subject content upon which the task is based or the instructions given to students; it depends on many factors, for example, students' interpretation of the task and how they respond to particular aspects of the task, their critical capacities to apply knowledge, their beliefs about their own capabilities, the learning processes they adopt and the learning resources they use, their motivations and the social environment within which the learning is embedded, and of course, the array of teaching aspects that are involved (e.g. the knowledge area, disciplinary practices, teaching strategies, etc.).

METHOD

A self assessment strategy was used to investigate three areas: (1) the effectiveness of students' capacity to assess their own academic performance; (2) the correlation between students' and the lecturer assigned grades; and (3) the effect of self assessment on students' learning. Data was obtained from 80 students enrolled in a second year unit within a computer science undergraduate course. The data was collected from two different cohorts in subsequent semesters. The study cohort was diverse in terms of language, age and gender. Almost 50% of students originated from countries other than Australia.

Students completed a self assessment questionnaire that included a range of items linked to the abovementioned aims (Note: this paper reports on the third aim of the study). Two questions about the impact of the self assessment task on their learning were included (i.e. notions of quality in written academic work, and motivation to critically evaluate and improve individual work). Responses to these items were recorded on a five point Likert Scale. The quantitative measurements were simply analysed and charted as sums and percentages using Microsoft Excel. Students were also encouraged to elaborate on the responses they supplied. The qualitative data was analysed using principles of content analysis (i.e. by identifying recurring patterns / themes in students' responses to the open ended questions).

FINDINGS AND DISCUSSION

The first key finding was that student assigned grades were concentrated on the upper end of the assessment scale whereas, the lecturer assigned grades were weighted more heavily towards the middle and latter end of the scale, with a relatively small percentage point difference in the lower three grades (i.e. nine, seven and four respectively) . The second key finding was that while there was a high level of correspondence between student assigned and lecturer assigned grades (42%), a large percentage of students (39%) assigned themselves grades higher than the actual grade assigned by the lecturer and about a fifth (19%) of the group had assigned them self a grade lower than the actual lecturer assigned grade. Both the effectiveness of students' capacity to assess their own academic performance and the correlation between students' and the lecturer assigned grades are discussed in depth elsewhere (Singh and Terry, 2008).

In this paper our focus is on the extent to which self assessment promoted attributes of sustainable learning. Therefore the third key finding was that 56% of students reported that the self assessment process assisted their understanding of what constitutes quality in a written assessment. It is disturbing that 44% of students were either neutral or derived no gain in their understanding of the quality indicators (see Figure 1).

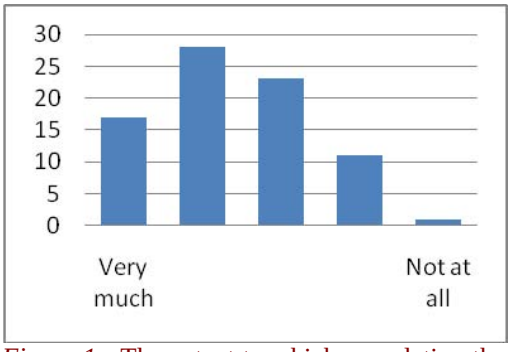

Figure 1: The extent to which completing the self assessment assisted students' understanding of 'quality' in their assignment.

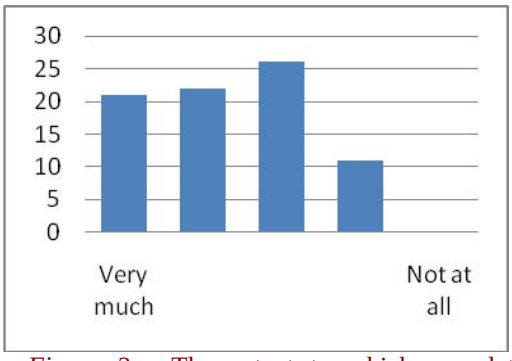

Figure 2: The extent to which completing the self assessment encouraged students' to critically evaluate and improve their assignment.

The fourth major finding was that a small majority (55%) of students reported that the self assessment process encouraged them to critically evaluate and improve their assignment. Again this leaves a disquieting 45% of the cohort as neutral or as having felt the assessment descriptors and their usage did not encourage them to evaluate and improve their work.

However, it is interesting that of the students who achieved a HD (80 – 100) or D (70-79) grade, 77% were positive about the self assessment having assisted their understanding of quality in the written assessment, and 75% were encouraged to critically evaluate and improve their assignment as a result of undertaking the self assessment. The likelihood is that the high performing students had adopted deep learning approaches as opposed to surface learning approaches, hence their improvement in understanding the notion of quality in academic work. However, it cannot be assumed that the self assessment strategy per se was responsible for deep learning, but it may have had a positive influence. On the other hand, of those students who received a N (Fail, below 50) or C (pass, 50-59) grade the comparative percentages were 38% (i.e. self assessment assisted understanding of quality) and 44% (i. e. self assessment encouraged critical evaluation and improvement) respectively.

Despite the underwhelming association between students' self assessment and positive impacts on their understanding of the quality indicators in the present study, the positive impacts on ways of learning that accrued should not be overlooked since there is ample evidence suggesting that self assessment results in improvements in students' capacity for self awareness and the ability to monitor one's own learning and performance (Cassidy 1999; Peters 2002; Reid, 2001). Indeed, it is likely that less motivated and weaker students were less clear on understanding the lecturer specified quality indicators, thus impacting negatively on self identified cognitive improvements. Also since almost 50% of this cohort was of an ESL background with varying levels of English language competency and new to the Australian higher education environment, it is plausible that these factors may also have influenced the results. In fact, for many students, this may have been their first encounter with self assessment, and it is assumed that others may have had limited experience with self assessment and or reflective learning. Their lack of self assessment experience may have undermined their ability to engage with the process effectively thus hampering their capacity to simultaneously distinguish the criteria and standards of performance being upheld and their use of these to guide and reflect on their learning. This demonstrates some of the challenges that arise from both the dual purposes of assessment, as well as the application of sustainable assessment in a particular teaching and learning environment. It is also possible that some students may have dispensed with the self assessment component in an instrumental way, and not engaged with it as a learning strategy to generate a self improvement orientation (i.e. sustainable learning).

Content analysis of students' comments demonstrated lifelong learning gains in the cognitive, meta cognitive, social and affective domains. Evidence of cognitive benefits was drawn from several comments along the lines of '. . . this gave me a deep understanding of the problem domain' and '. . . my understanding of the issues improved. . . .' Likewise, evidence of reflective learning indicated

meta cognitive gains. Students showed awareness about their learning, for example, a student said: 'this is the grade I would like to get but may not due to . . .' Another student was particularly eloquent in the description of benefits derived from the self assessment experience. She said:

> I never thought a self assessment will make me strive to do my best until I did this assignment. I really made sure all the criteria of the assignment were met as I had to justify my grade. Although I could have gone for the HD, I was not that sure I could justify it therefore selected D. I think I have met all the requirements of researching extensively, discussing the tools and techniques that could be used, discussing the processes involved in all the areas, explaining the benefits of following the right path and the consequences of not planning a project well.

The findings showed that students' awareness of their strengths and weaknesses in the knowledge area, their capacity to apply this knowledge as well as the learning strategies they employed were brought into consciousness, as was the case in McNamara and Deane's study (1995). A further aspect of reflective learning is an improvement orientation, which was shown in comments such as 'I need to work on my grammar . . .' 'Because of bad time management and planning . . . next time I will . . . '; 'I am aware my . . . is not acceptable, I need to . . .' Both, the capacity for reflective learning and an improvement orientation were evident from students' responses therefore reinforcing the finding that the self assessment strategy promoted sustainable learning for a large number of the students involved in this study.

The self assessment strategy also promoted dialogue between individual students and the lecturer about their learning. Common themes in the written dialogue included the scope of the assignment, the nature of resources that they had used, knowledge that was generated by consulting with experts in the field and peers, challenges encountered in their application of theoretical knowledge, etc. By promoting dialogue, the self assessment strategy encouraged students to tap into the social domain to support and extend their learning. Hence, social engagement was channelled to foster sustainable learning.

Affective dispositions were somewhat harder to track in students' responses as these were generally expressed as likes and dislikes about the work they had produced. Some of the comments included earlier allude to improved self motivation, which Longhurst and Norton (1997) identify as significant for life long learning. The affective domain is further linked with dispositions such as perseverance, internal motivation, responsibility, self management, self efficacy, and independent learning. Generally, students recognised these as facets that contributed to the quality of their learning and which had positively impacted their assessment outcomes. This positive association between affective dispositions and quality of learning has been widely reported in literature cited earlier (for example Cotton, 2001; Peckham and Sutherland, 2000; van Krayenoord and Paris, 1997; Black and Williams 1998).

CONCLUSIONS AND IMPLICATIONS

This study has highlighted the complex issues involved in fostering self assessment skills to promote sustainable learning in students. The findings have demonstrated that a particular self assessment strategy achieved the goals of sustainable assessment in so far as it contributed to building students' capacity to judge the quality of their work against given criteria and that it stimulated an improvement orientation that extended students' learning. However, it is difficult to anticipate whether the learning and self awareness gains would be sustained beyond the assessment context as this is influenced in varying ways by students' personal affective attributes. Given these complexities, self assessment can only foster sustained learning when it is appropriately integrated into the curriculum at various levels – it cannot simply be operationalised in an instrumental way. It is crucial that sustainable assessment be guided by the principles of both lifelong learning and formative assessment.

The study has raised some significant implications about sustainable assessment. Firstly, what is considered a sustainable learning process in one situation or for one student may not be so in another situation or for another student. Secondly, an assessment cannot be judged as contributing to sustainable learning simply on the basis of the task and instructions given to students; it depends on many interrelated factors that impinge on the teaching and learning environment, for example, the nature of the task, students' interpretation of and how they respond to particular aspects of the task, the tools for self monitoring and judging progress that are available, the opportunities available to apply the knowledge and skills in real world situations and nature and quality of feedback students receive about their learning. However, there are many factors that may lie outside of the direct scope of teaching and assessment, for example students' beliefs about their own capabilities, their attitudes and motivations about learning, their perceptions about the learning environment, the learning processes they adopt and their level of intellectual and social engagement within the learning environment. Ongoing attention to these factors can continuously and positively shape sustainable assessment.

This initial investigation into the benefits of a self assessment strategy has provided the impetus to continue our work on sustainable assessment in a more integrated and rigorous manner, possibly by beginning with attempts to construct sustainable assessment (formative) across the entire unit, and later to explore opportunities to extend the work across units within the course (vertical sustainability). Areas for further exploration include the development of appropriate self monitoring tools for students to assess their progress, integration of opportunities for dialogue with peers and the lecturer to encourage exchange of ideas and facilitate various levels of feedback on individual progress. To prevent premature closure on ongoing learning, ways of integrating student debriefing will also be explored.

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Factors Affecting Team-Based Learning in Industrial Education: Thai Instructors' Perspectives

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ABSTRACT

This study was conducted to explore instructors' perspectives of factors affecting Team-Based Learning (TBL). We administered a likert-style questionnaire with a seven-point rating scale to 153 instructors from six Faculties of Industrial Education throughout Thailand. The questionnaire's content validity was examined by five experts. Its reliability calculated by Cronbach Alpha Coefficient was 0.94. We identified six factors as follows: (1) Knowledge and Comprehension (2) Objectives of Learners' Readiness (3) "Don't Do" Activities (4) Teaching and Learning Activities (5) Roles of Instructor and Learners (6) Principles and Planning of TBL.

In general, our results suggest that TBL requires specific skills such as consensus building. It requires a knowledge base. Therefore, those individuals and institutions interested in promoting TBL will need to invest human and financial resources into ensuring that instructors and learners have the necessary knowledge and skills in order to successfully engage in this new form of learning.

Keywords: Team-Based Learning/Industrial Education/Instructors' Perspectives/Factor Analysis

INTRODUCTION

Team-Based Learning (TBL) is a powerful instructional strategy that can be applied to a variety of disciplines and class sizes. According to Michaelsen (2004), TBL is a one of the few instructional strategies that can be used effectively in large classes as well as in small classes. It transforms how classroom time is used and the roles that students and teachers play in the learning process. In TBL, students start by doing readings that introduce them to course concepts. Students are held accountable for this work through a Readiness Assessment Process (RAP) to ensure that they are ready to work on applications of the concepts when they come to class. In addition, students will be able to change their attitude towards responsibilities, develop human relationships from working as a team, exchange ideas, and apply knowledge to "real life" situations and/or to new problems (Paulson & Faust 2000). Instructors can take full advantage of class time by letting students work in teams on higher-level problems that exercise students' judgment rather than simply their basic knowledge (Hodgson &

Ostafichuk 2005). The organization of the teams is around problem solving (instrumental learning); but specifically, team tasks involve coming to a consensus among several choices regarding the "best" choice. This coming to consensus forces communicative learning. Students must discuss subject matter at depth, promoting their own choice or coming to understand others' choices. In the process, students are freed of prior misconceptions (Michaelsen 1973).

TBL is particularly important in industrial education because the profession requires that individuals work in teams. Tasks are constructed that require groups to consider different possibilities and then come to a consensus decision about the "right" answer (Slavin 1995). In Asian countries and in Thailand, there is a tradition of working individually and of following the leader (Jamornmarn 1996). TBL in Industrial Education (IE) in Thailand; therefore, presents challenges. Although it is an important area, little is known about TBL in IE in Thailand. The purpose of this paper is to fill this gap in the literature.

OBJECTIVE OF THE STUDY

The objective of this study was to identify and analyse factors affecting TBL in Industrial Education (IE) according to Thai instructors' perspectives.

OUTCOMES OF THE STUDY

The results of this study will be useful as follows:

1. For IE instructors in terms of providing them with more knowledge of TBL and for innovation in classroom learning as well as knowledge about designing and planning the process of TBL.
2. For policies of Faculties of Industrial Education in terms of supporting TBL and setting conditions for optimal implementation of TBL.
3. For building a theoretical basis for TBL in contexts of IE.

THEORETICAL FRAMEWORK

The theoretical framework used in this study is shown in Figures 1a and 1b (Michaelsen 2002). The figures outline the roles of instructors and learners in TBL.

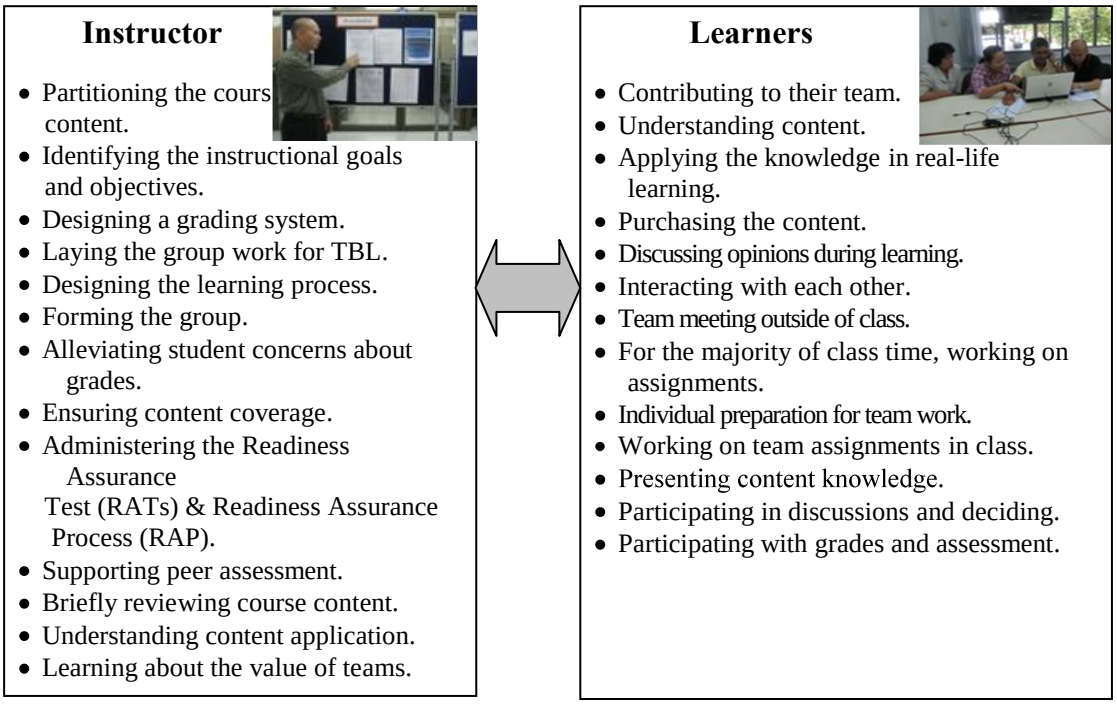

Figure 1a: Instructor

Figure 1b: Learners

Figure 2 outlines the TBL process before, during, and after. This process involves a feedback loop whereby the measurement and evaluation that takes place at the end can subsequently inform future TBL activities.

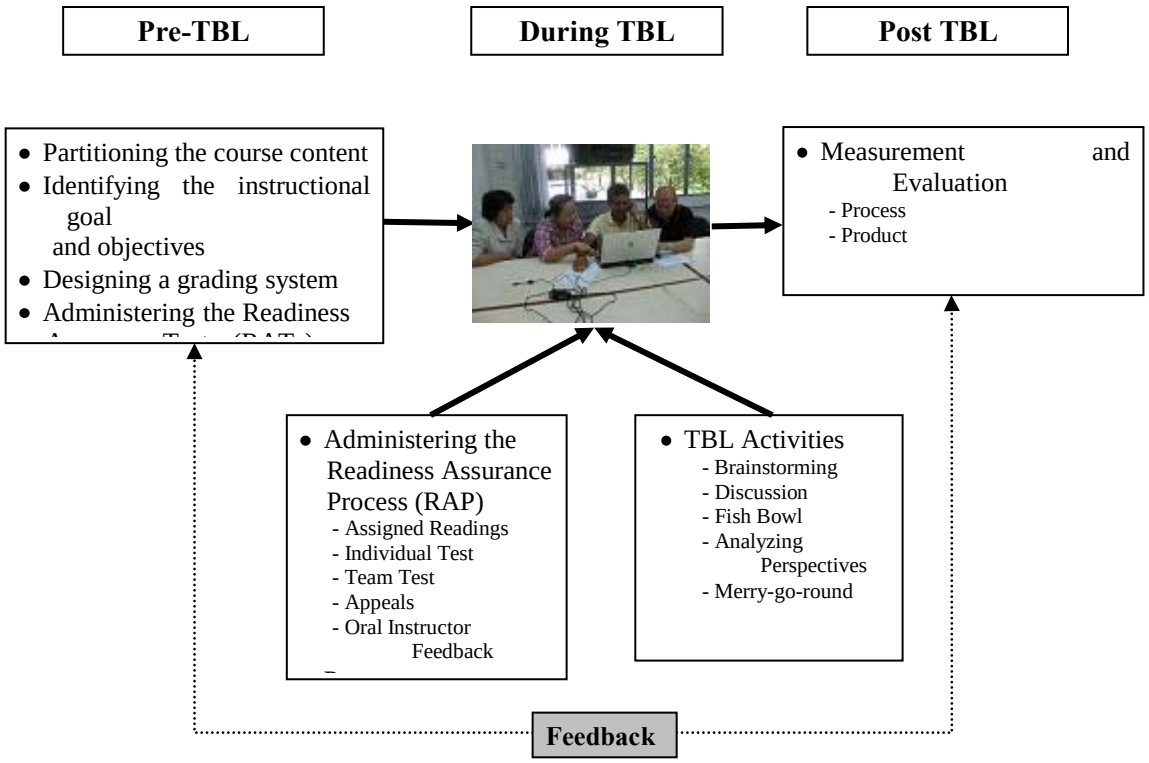

Figure 2: The process of TBL

RESEARCH METHODOLOGY

Data Collection

Permission to conduct the study and recruit participants was obtained from the King Mongkut's University of Technology, Thonburi, King Mongkut's University of Technology, North Bangkok, King Mongkut's Institute of Technology Ladkrabang, Rajamangala University of Technology Krungthep, Rajamangala University of Technology Thanyaburi, Rajamangala University of Technology, Phra Nakhon, Thailand for all six campuses.

Recruitment letters along with a questionnaire were sent to one campus while, for the other five campuses, the letters and questionnaire were distributed in person by the researchers.

Questionnaire

The nine-page questionnaire used a seven-point likert scale with 117 variables. The points on the scale ranged from Strongly disagree; Disagree; Somewhat disagree; Neither agree nor disagree; Somewhat agree; Agree; Strongly Agree. The questionnaire took approximately one hour to complete. The questionnaire was examined to find the content validity with the index of consistency (IOC) technique by five experts. Then, the variables were adapted as per the experts' recommendation. Next, the adapted questionnaire was tested with 30instructors not in the study's sample. Reliability was tested using the Cronbach Alpha Coefficient. The result was 0.94. The questionnaire was sent out to 497 instructors by mail in July, 2008. By September of the same year, 153 instructors had returned completed questionnaires. This equals a response rate of 30.79%.

Data Analysis

Data analysis began by testing the adequacy of the 153 instructors with Kaiser–Meyer–Olkin Measure of Sampling Adequacy (or KMO). The adequacy was 0.891 which means the sample was suitable for Factor Analysis. We used descriptive statistics such as mean ($\bar{X}$), Standard Deviation (*SD*) of each variable and average score to judge the validation. Pearson's Product Moment Correlation of each variable was used to show the relation matrix and test significance. Theoretically speaking, in order to analyse the factors of TBL, the factor loadings will not be weighted below 0.40. We then interpreted the factors and labelled them with new variables. This step required experience in labeling and giving a meaningful name to each factor by considering variables for such factors. Those involved in this step were the principal investigator, a co-investigator and one expert.

RESULTS OF THE STUDY

The mean of 117 variables were between 4.535- 6.366 which meant that the range of participating instructors' agreement on the variables affecting TBL was from 'somewhat agree' to 'agree' levels. The standard deviation was between 0.873-2.019 which means that the instructors' agreement was not unanimous.

Instructors identified the most important factors as follows: cultivating learners' work as a team; learners' comprehension and understanding; the importance of working as a team; and applying newly received knowledge. They identified the least important factors as follows: reducing instructors' teaching loads in the classroom; showing conflicts of opinions; and teaching each course rapidly.

Table 1 presents the items for one of the six major factors: Roles of Instructor and Learners consisted of 21 of 55 variables. These 21 variables had factor loadings weighted 0.605-0.822 along with the eigenvalues of 14.472 or 26.313%.

Item #	Variables	Factor's Loadings
101	Interacting with others	0.822
100	Devoting time and effort	0.813
102	Working in a team to gain high quality	0.793
57	interaction in the team	0.790
107	Participation in thinking, discussion, and decision-making	0.781
99	Preparing for team working	0.779
110	Applying knowledge in the future	0.777
112	Working with other learners	0.763
73	Learning how to work together	0.759
58	Decision-making	0.758
72	Learners know how to behave to be effective and successful.	0.743
109	Active learning	0.731
98	Learners record changes in the team during work.	0.728
63	Learners should understand and know the importance of team-work	0.727
97	Analyzing the obstacles to team success	0.716
27	Learners' understanding of the subject contents.	0.709
56	Encouragement among peers	0.678
77	Sharing responsibilities among learners	0.674
61	Team performance	0.658
62	Support from each member.	0.651
95	Write or record changes or situations which result in changes.	0.605

Table 1: Factor 1, Roles of Instructor and Learners

Table 2 presents Factor 2: Teaching and Learning Activities. This factor consisted of 10 to 55 variables with factor loadings weighted 0.581 – 0.762 along with the eigenvalues of 6.402 or 11.639%.

Item #	Variables	Factor's Loadings
74	Building enthusiasm	0.762
76	Not worrying about being accepted by others.	0.737
68	Tolerance for minorities, races and disabilities.	0.699
75	Evaluation method is suitable.	0.693
66	Learners should understand and know the importance of team working.	0.649
116	Answering questions or problems in series.	0.638
115	Understanding knowledge in terms of the contents taught.	0.638
113	Many situations are used to present the contents in front of the classroom.	0.626
111	Responsibilities in searching for contents of the subject	0.602
64	Scores from five (Readiness Assurance Tests) RATs are shown to each team	0.581

Table 2: Factor 2, Teaching and Learning Activities

Table 3 presents Factor 3: Knowledge and Comprehension. This factor consisted of 10 from 55 variables with factor loadings weighted 0.622 – 0.901 along with the eigenvalues of 6.363 or 11.569%.

Item #	Variables	Factor's Loadings
48	Individual Test' RATs are used to evaluate the reading materials or assignments.	0.901
47	Reading task' Learners read materials and exercises which must be finished outside class.	0.878
38	To give instruction in shorter time.	0.838
37	To reduce wasted time of instructors.	0.801
49	Team testing is evaluated repeatedly and the same questions as in individual test are used.	0.788
78	Contents of the subject are limited when there are assignments about team work in classroom.	0.700
80	Instructors must explain how to work as a team so that learners understand the system of team-work.	0.698
79	Instructors must reserve time for solving disagreements in teams.	0.697
103	Gaining scores from Readiness Assurance Tests (RATs).	0.632
60	Individual performance.	0.622

Table 3: Factor 3, Knowledge and Comprehension of TBL

Table 4 presents Factor 4: Principles and Planning. This factor consisted of 7 from 55 variables with factor loadings weighted **0.**622 – 0**.**791 along with the eigenvalues of 5.144 or 9.352%.

Item #	Factor's Variables	Factor's Loadings
8	Books chosen as reading material outside class are related to the main	0.791

	ideas of the subject taught.	
7	The contents are divided into units consisting of 2-4 lessons.	0.782
9	Study time is scheduled in terms of weeks.	0.742
4	There are 5-7 members in a team.	0.711
10	There is tracking on activities inside and outside class.	0.709
5	There is variety in concept and imagination.	0.677
2	Obstacles to team strength are reduced.	0.622

Table 4: Factor 4, Principle and Planning of TBL

Table 5 presents Factor 5: "Don't Do" Activities. This factor consisted of 4 from 55 variables with factor loadings weighted 0.719 – 0.868 along with the eigenvalues of 3.261 or 5.930%.

Item #	Variables	Factor's Loadings
88	No suggestions on dividing task to each member.	0.868
87	Depending on competent members only.	0.842
86	Expressing dispute.	0.720
89	Smaller groups inside the team.	0.719

Table 5: Factor 5, "Don't Do Activities"

Table 6 presents Factor 6: Objectives of Learners' Readiness. This factor consisted of 3 from 55 variables with factor loadings weighted 0.761-0.782 along with the eigenvalues of 2.880 or 5.237%.

Item #	Variables	Factor's Loadings
42	To gain higher motivation in interaction.	0.782
41	To pay more attention to team goals.	0.777
40	To have interaction with others in a fast and informal way	0.761

Table 6: Factor 6, The Objectives of Students' Readiness

These six factors found in this study that affected TBL could be explained as 70.040 % of the total variance. The Correlation Coefficient between six factors that affected TBL was 0.529 – 0.698, which was at high level because in order to separate factors of TBL, the factor loadings will not be weighted below 0.40. However, the Correlation Coefficient within the six internal factors was 0.001–0.100, which was at low level. This is shown in Figure 3.

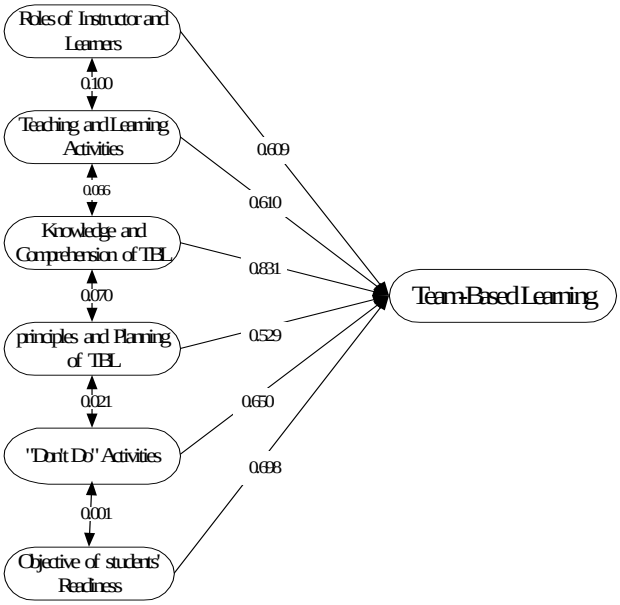

Figure 3: Confirmatory model showing correlation coefficient within six internal factors affecting TBL in industrial education according to Thai instructors' perspectives

The regression or predicting equation of factors affecting TBL was:

$$Y = .699(R_{oles\_of\_Instructor\_and\_Learners}) + .610(T_{eaching\_and\_Learning\_Activities}) + .831(K_{nowledge\_and\_Comprehension\_of\_TBL}) + .529(P_{rinciples\_and\_Planning\_of\_TBL}) + .650(\text{“}D_{on't\_Do\text{”}\_Activitiesi}) + .698(O_{bjectives\_of\_Learners'\_Readiness})$$

The prediction equation had the power of prediction 50% and error of prediction was 16.667%. When we rank the factors in terms of importance for instructors, we have the following order: (1) Knowledge and Comprehension (2) Objectives of Learners' Readiness (3) "Don't Do Activities (4) Teaching and Learning Activities (5) Roles of Instructor and Learners as well as (6) Principles and Planning of TBL.

DISCUSSION AND CONCLUSIONS

This study was conducted to explore instructors' perspectives on factors affecting Team-Based Learning (TBL). The sample was 153 instructors from six Faculties of Industrial Education throughout Thailand in 2008. The instrument used for data collection was a likert-style questionnaire with seven rating scales. Content validity was examined by five experts. The reliability of the instrument calculated by Cronbach Alpha Coefficient was 0.94. The results identified six factors as in: (1) Knowledge and Comprehension (2) Objectives of Students' Readiness (3) "Don't Do" Activities (4) Teaching and Learning Activities (5) Roles of Instructor and Learners as well as (6) Principles and Planning of TBL. The reason why 'Knowledge and Comprehension' play the most important role affecting TBL to be effective and efficient is that TBL is quite new for Thais. If both instructors and learners do not understand the procedure and the objectives of TBL, the instruction will fail. Moreover, instructors also perceived that student readiness was the second most important factor for the success of TBL. This means that learners should prepare and read contents before each class. However, instructors never know whether learners read their assignment or not. Therefore, instructors should give a test for each person and for the team in order to know the readiness of learners based on their scores. As for 'Teaching and Learning Activities,' they play an important role because these must be done by learners and instructors who work as facilitators. TBL is useful due to the fact that each person must work in teams and that the teams always encounter the occasion when they must reach a consensus by deciding one "right" answer out of different possibilities (Slavin 1995). Learners in Industrial Education must undergo the procedure of depriving misunderstandings by discussing the subject matters at depth in order to achieve the consensus through communicative learning (Michaelson 1973). However, 'Principles and Planning' of TBL play the least important role because instructors must have planned before the semester starts; thus, this procedure is not that complicated.

Moreover, if the questionnaire had been administered with learners, 'Knowledge and Comprehension' may not have ranked as highly. The first two factors related to the success of TBL places on learners in terms of the knowledge base and preparedness. The factors directly related to the instructor are ranked after factors related to learners. This suggests that instructors perceive learners' role in the success of TBL as being very important.

LIMITATIONS AND IMPLICATIONS

This paper was limited to one country and one university only. Results may have been different if the study had been administered in a different university, country or faculty. It is possible that TBL is more important in certain disciplines than in others. Researchers may wish to replicate this study in other contexts to determine if results might be similar or different. Also, the study investigated instructors' perspectives only and not those of learners. It would be interesting to compare the factors that learners consider important with those considered important by instructors. The response rate for the questionnaire was low at approximately 30%. It is possible that only those instructors who

consider TBL important responded. A larger response rate may have yielded different results. The response rate may have been affected by the fact that the questionnaire was nine pages long. A shorter questionnaire might yield a higher response rate. The study focused only on instructors' perspectives. There was no observation of their practice. Therefore, we do not know if, in fact, their perceptions would actually translate into classroom behaviours.

In terms of implications for practice, since instructors consider knowledge of TBL to be of prime importance, they will need to ensure that their students have this knowledge of TBL. If it is important that learners be able to build consensus, engage in critical thinking and apply knowledge rather than simply gain knowledge, then they will need education or training in these areas. We cannot assume for example that learners will be able to build consensus without having been given some specific techniques for doing this. In terms of policy, it is important that institutions ensure that instructors have the requisite knowledge about TBL. This may require special training or professional development opportunities.

In terms of future research, it would be of use to study the factors that learners consider important. In general, our results suggest that that TBL requires specific skills such as consensus building. It also requires a knowledge base. Therefore, those individuals and institutions interested in promoting TBL will need to invest human and financial resources to ensure that instructors and learners have the necessary knowledge and skills in order to successfully engage in this new form of learning.

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The Development of Community Business Networks of Sanpapao, Nongyeang and Sunnameng Sub-districts in Amphoe Sansai, Chiang Mai to Strengthen Sustainability

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ABSTRACT

The study aimed to probe the characteristics of community, and community businesses and their development through a co-learning process between researchers, communities, and their alliances.

The Participatory Action Research (PAR) was used as a tool to analyse response from 80 members of 10 community business groups in Amphoe Sansai, Chiangmai. Participants included professors, students, communities and alliance organizations to participate in identifying issues and their underlying cause in addition to developing and implementing an action plan based on the experience of the participants.

The results indicated there was a disconnect between the local wisdom and technology which led to the establishment of the "Harn Nam" project, the local handcraft conservation street. The collaboration between different organizations (e.g., local administrative organizations, Department of Community Development, Sansai community, Poverty resolving group, government agencies, private organizations) resulted in an exchange of ideas, and a willingness and commitment to participate in a collaborative process with benefits to educators and students. This accumulated knowledge could then be used to further develop a model for community development based on the appropriate context.

The use of PAR as a research framework facilitates the development theory appropriate to community phenomena by applying system analysis and thinking system appropriate for the implementation and the development of the important role players, which were leaders and members of the groups. Furthermore, this framework has the potential to increase future participation of local people within the community for better adaptation within the Thai society.

Keywords: Community, Community Businesses Network, Co-learning

INTRODUCTION

The strengthening of the community can be accomplished by the development of human resource as the centre of the community. This mechanism may be referred to as the whole body development in which it is beneficial to all concerned parties in the community in terms of spiritual, economic, social, political and environmental aspects. This may be achieved by increasing its potential and creating environmental conditions which contribute to the strengthening of the community for self – development (Techawanit, 2000 : p.17).

People in the community are encouraged to participate in the analysis of current situations, community problem finding, determination of ways for solving the problems, decisions in activity selection, implementation and evaluation. These issues may form the basis for solving problems and difficulties within a community. Ideally this process should start with the community. (Suwan, 2000 : p.16).

For example, the community business groups in Chiang Mai province realized that on the community business which is only dependent on the assistance of the government sector, cannot be sustained or strengthened. This is highlighted in one area where government policy for the support of the One Tambon One Product (OTOP) project is being reduced, besides, the assistance does not meet the needs of all community business entrepreneurs. Furthermore, many agencies do not sincerely support community business entrepreneurs. In fact, the communities have several natural resources and prominent folk wisdom which do not impact on the community business without any affect towards the community's way of life.

In light of the issues raised above, the community business groups in Sansai district, Chiang Mai province have formed 10 groups which aimed to solve these problems. Participatory action research (PAR) was adopted as the underlying framework for the research to provide an opportunity for academicians, developers and people in the communities to share or exchange their ideas and combine their strength for positive community development.

The objectives of this research were to investigate the following:

Characteristics of the community and community business of Sanpapao, Nangyaeng, and Sunnameng sub – districts, Sansai districts, Chiang Mai province;

Determine ways for the development of community business alliances of the three sub–districts;

Identify mechanisms for the construction and development of mutual learning process among teachers, students, local people and concerned agencies; and

Identify and document the outcome of the mutual learning process.

EXPECTED OUTCOME

The research was conducted in the community business of Sanpapao, Nangyaeng, and Sunnameng sub – districts, Sansai district, Chiang Mai province. The research aimed to achieve the following.

General Outcomes:

Obtain ways for the development of community business networks for sustainable self – reliance.

Identify a method of analysis for the potential of the community business.

Determine a mutual learning process which can be adopted by the communities or concerned agencies.

Develop an understanding of processes which may be useful as a guideline for the sustainable strengthening and development of the community business.

Teachers and Students:

Obtain forms and ways for the development of community businesses which can be adopted by other communities

Obtain the co-learning process and new body of knowledge from the communities which can be applied for the benefit of all community members.

Community Agencies:

Obtain the co-learning process which can be used for solving the problems and it also meets the needs of the communities

The outcome can be used in the determination of policy the next time.

The Research Question was:

How can the community business groups of Sanpapao, Nangyaeng, and Sunnameng sub–districts sustain and strengthen and develop their community business alliances?

CONCEPTUAL FRAMEWORK

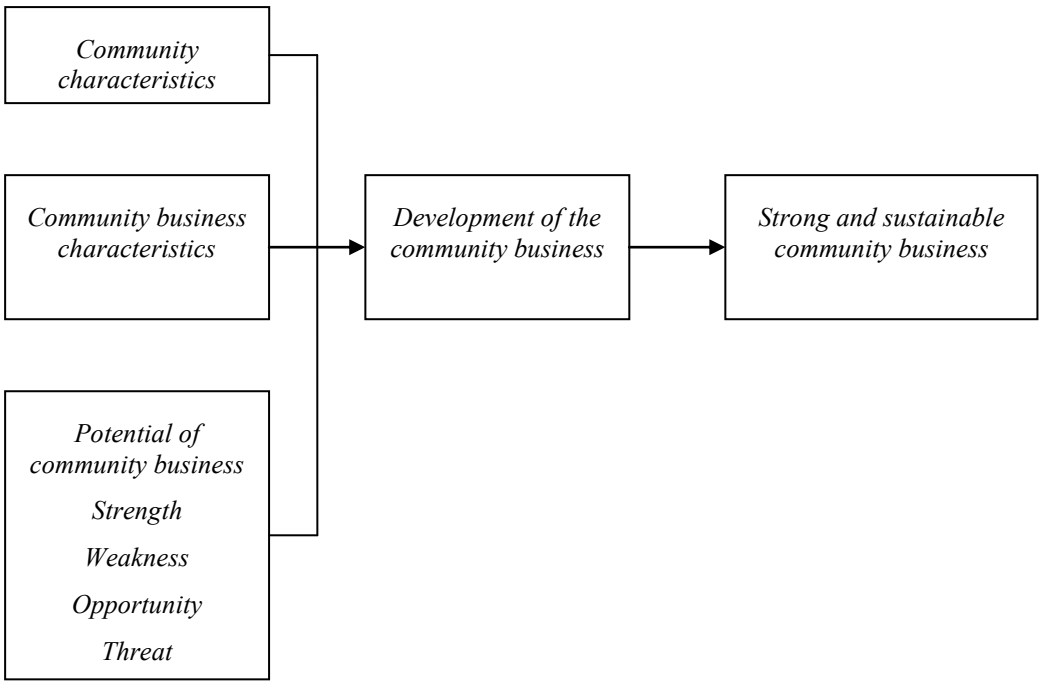

Figure 1: Concept framework of the research

RESEARCH METHODOLOGY

Participants

The respondents in this study were 10 groups of community business in Sansai sub-district, Chiang Mai province. Each group selected a group head and secretary to serve on the management committee. Details are shown in Table 1.

Table 1: Numbers of group members in each community business group.

Community	*Group*	*No. of members*
Sanpapao community	*Cotton hand weaving group*	*4*
	Koi Kon ka porcelain sculpture group	*8*
	Baan Chiangsaen handicraft group	*3*
Nongyaeng community	*Khanom Jeen and Chilli paste group*	*7*
	Cloth scraps handiwork group	*4*
	Baan Dongcharaenchai weaving group	*5*
	Wooden lampshade and toy group	*8*
	Sornchan herbal group	*13*
Sunnameng community	*Artisans of Sansai group*	*23*
	Northern charming cotton group	*5*
Total		***80***

Procedure

The creation of partner relationship - the research team reviewed concepts and held informal meeting of all stakeholders.

Participatory Rural Appraisal (PRA) the research team identified problems and their causes and sought unique ways for systematic problem-solving by engaging members of the local population at a suitable local venue, discovering evidence, and reaching conclusions.

Participatory Planning for Action (PPA) the research team prepared the plan for the communities and coordinated the implementation with various concerned agencies.

Experience transfer was conducted during the project implementation and after completion.

Analysis

The research team had analysed the obtained data by the transfer of mutual experience in terms of problem analysis, causes of the problem and ways for solving the problem. Qualitative method was also used for data analysis together with monitoring of data obtained from recording. This was done based on the actual incidents.

RESULTS

Community Characteristics

The three communities in this study shared similar characteristics and cooperated with each other, they were unique and helpful to one another. They grouped themselves in order to develop their careers and communities by using their respective folk wisdom. The museum of Rongmeng temple was used as

the centre of their spirit. Also, these communities could maintain their Lanna culture and tradition up to the present. Most of the community members were engaged in farming and were elementary school graduates. They were organised headed by village heads, sub-district heads and the sub-district administrative organizations.

Community Business Characteristics

The community business of each group was organized in the form of both formal and informal grouping in which each group was sometimes dependant on one another. Based on the SWOT analysis for finding competition potential of each group such as marketing, finance, and group management, it was found that they had to improve their potential in all aspects. Moreover, some groups could not identify their potential whereas some others needed assistance from concerned government agencies and were not self-reliant

The following were the outcomes of the development of community business alliances:

The community business could analyse encountered problems and causes of the problems. It was found that their way of lives had been changing and their community business was not strong and sustainable. The research team found that doing community business which was only dependent on government sector could not make the business sustainable.

The community business could find ways for solving the problems. The research team had sought for local wisdom in the three communities and finally found that these communities had a well-known tourist spot - the museum of Rongmeng temple. Besides, the community business groups had applied their folk wisdom and raw materials to the production to their products the groups of Sansai artisans and the group of cotton hand weaving.

The community business could gather human resource business groups, and community power. They grouped themselves based on their common problems. The leader of each group initiated the investigation of problems, causes of the problems and problem solving. This was initiated by eight community business groups and the other two groups followed them thereafter.

The community business could coordinate or negotiate with other external organizations and institutions. The community business groups could propose the project on the road of local handicraft conservation under the “Harn Nam” project to the external agencies for the negotiation of resource and technology exploitation. They had negotiated with the sub-district administrative organizations of Sanpapao, Sunnameng and Nongyaeng, the Community Development Division of Sansai district, the caravan for poverty alleviation of the government agency, the agencies responsible for strategic aspects of the Upper North provinces, the agency responsible for strategic aspects of Chiang Mai province and the Tourism Authority of Thailand.

The community business could practice on problem-solving. They could coordinate or do activities with external agencies. Besides, they could implant their members on self-reliance and they gave moral support in the case that some of them foiled in doing something. The community business groups had learned through experiential learning and the lessons from the successful conditions. After finishing the research, it was found that they were able to do their tasks without supervision which was headed by the core leaders of the community business groups.

Co-learning Process and its Outcome

The research team, teachers, students, community, and various concerned agencies participated in the co-learning process. The main way was through brain storming which aimed to ensure the correct procedures were followed. Through the use of the participatory action research process, these participants shared their strengths cooperatively in the learning process. Teachers and students were

good at analyses but they did not know the problems well whereas various concerned agencies had skills in practice and resources but they did not know the problems well. They also were not as competent with the analyses as compared to teachers and students. Meanwhile, the community business groups knew the problems well but they had less experience with potential on the analyses and resources than the various concerned agencies.

It was also found that the point of view of the communities had changed a lot. In the past, the communities mostly waited for the assistance of the external agencies. After these external agencies moved out of the communities, the community activities assisted by the external agencies faded away. The communities had a concept to develop themselves in order to be self-reliant after they had learned about the process on participatory action research. They were eager to develop their community business groups and to improve the landscape of the location of their business groups. Moreover, there were more communication and dependence among their community business groups. They considered the "Harn Nam" project as the way for their community business development in which they were able to learn more about the success, failure, obstacles and conflicts occurring in the working process.

LIMITATION OF THE RESEARCH

The community business development using the participatory action research in this study still encountered obstacles in the community business grouping. This was because of the different potential of each community business group which made it difficult to determine a common point of collaboration for the groups. For example, the research team and the people in the communities were unavailable at similar times which resulted in incomplete data collection. Thus, the research team changed the schedule for informal discussion and data collection. Some participants were not well versed in the research process and found it difficult to convey their thoughts in the written language. Some community members could not clearly differentiate their strength points, the weakness points, the opportunities, and the threats of the community business. Thus, the research team used the SWOT analysis as the medium to inform participants. Finally, time constraint was an obstacle in this study.

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Construction of an Automotive Technology Competency Analysis Profile for Training Undergraduate Students: A Case Study of Automotive Body Electrical Technology Systems

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ABSTRACT

The purposes of this study was to construct an automotive technology competency analysis profile for training undergraduate students of Mechanical Technology Education program at King Mongkut's University of Technology Thonburi and to identify the tasks list of automotive body electrical technology systems. The qualitative and quantitative data was collected through observations, in-depth interviews, document analysis, and DACUM (Developing a Curriculum) job analysis process with 17 training instructors from 12 well-known car automobile companies in Thailand. The triangulation method was referred to validate an automotive technology competency analysis profile**.** The results of this study indicated that were 7 job duties, 86 tasks and 7 core competencies framework. Moreover, the importance of 56 core competencies as rated by respondents and the mean rating was calculated for each competencies item. The quality of the resulting had to apply the systematic curriculum and instructional development to effective implementation guidelines. They can be applied to change the training program of prospective mechanical technology education to enhance future students' competency.

Keywords: Automotive Technology Education, Competency Analysis Profile, Students' Competency

INTRODUCTION

Is Thai automotive technology education ready for the challenges of the future? Technology is embodied in devices that extend human capacities. It provides the tools to extend Mechanical Technology Education (MTE) Program at King Mongkut's University of Technology Thonburi (KMUTT). As technology assumes an increasingly dominant role in society, technology literacy is becoming as essential as students' competency and the ability to service, repair and diagnosis. In providing the fundamentals of technological literacy, technology education increases capability to prepare to live and work in a world of continuously evolving technologies. Current automobiles are a challenge to service and repair because of this advanced technology, but the future automobile will be even more complicated (Riley, 1985). This advanced and continuously evolving technology will require students' competencies to have greater knowledge, skills, and attitudes. In the area of triple service, repair, and diagnosis, a technologically literate student uses tools, materials, training systems, and processes in an informed, ethical, and social responsibility.

The MTE program at KMUTT separates into 5 areas, these are: 1) applied engineering mechanic; 2) thermal engineering; 3) dynamic systems and control; 4) automotive technology; and 5) applied educational technology. The nature of MTE programs requires the integration of different disciplines such as general education (e.g., mathematics, science, social science, computer programming, information technology, language arts, leadership and management), mechanical engineering, electrical engineering, electronic engineering, industrial engineering and industrial education and training, etc. Therefore, the purposed education development is motivated by the need for a systematic

MTE educational curriculum between mechanical engineers and technical teachers/trainers (Technologist/Experts in training). The concept of teacher training in MTE programs is to stress implementation of teaching technique principle and to emphasize the knowledge, skills and attitudes in field of mechanical engineering and educational technology. Derived from the concept of industrial education is a terminology used more specifically in this research to describe social demands that need competency-based learning strategy for student development. With collaborative efforts, enterprise and university jointly design learning programs to meet the demands of potential student as well as the needs of social demand.

Moreover, automotive technology changes affect adjustments in, and instructional system and design of, students' competencies. Thus, MTE programs should use a suitable competency analysis model in order to establish the competency connation and standards in every domain. The intention is to find out accurate reference information for course development, instructional design and evaluation targets (Casey, 1999). Consequently, the development of an automotive technology competency analysis profile model is actually an important requirement for training undergraduate students. Thus, the purposes of this study were: 1) to construct an automotive technology competency analysis profile for training undergraduate students of Mechanical Technology Education program at King Mongkut's University of Technology Thonburi; and 2) to identify the tasks list of automotive body electrical technology systems that are performed by training instructors.

The research question included:

1. How to identify effectively a competency analysis profile model depending on social demand?
2. What are the essential guidelines to implement a competency analysis profile in the context of automotive body electrical technology systems?

REVIEW OF THE LITERATURE

In order to accomplish this research, it is essential to understand the characteristics of competency analysis.

- Rationale for designing competency analysis profile

Competency analysis identifies the essential behaviour model for professionals to carry out a task or mission. This behavioral model includes motive, characteristic and skill or knowledge of the fundamental characteristic. Specially, competency refers to the performance that a person has to implement in order to work effectively, especially when adequately playing a role or undertaking a task/mission. Furthermore, it can be observed and measured (International Labour Organization, 2002). Thus, competency is not only the aggregation of knowledge, skills, and attitude, but also a dynamic concept of putting action into practice. In particular, it also means to accomplish the purpose of learning outcome under a specific need. In order to achieve the goal of automotive technology training effectively, what needs to be done first is an analysis of the content of the competency in education and training so that the items and standards concerning measuring competencies can be determined.

- The function of competency analysis profile

The implementation of an educational training program should be based on social demands, and the competency analysis process identifies whether students have attained the competency standards proficiently. The purpose is to let graduates devote themselves to the effect of globalization and revolutions in technology within social demands and graduates' skills. The main purpose of competency analysis is to analyse one occupation to improve a learners understand and approach in the content deals of work habit, work situation, and workplace. It is essential to have to integrate knowledge, skills and attitudes that he/she possesses.

- The DACUM process

DACUM was derived from the phrase "Developing A Curriculum" and DACUM approach was created in July 1968 in British Columbia, Canada. It is a competency-based approach to curriculum development and places the emphasis on the learners gaining ability to meet specific objectives formulated according to a set of standards. DACUM is based on three assumptions as follows: 1) Expert workers can define and describe their job more accurately than anyone else; 2) Any job can be effectively described in terms of the tasks that successful workers in that occupation perform; and 3) In order to be performed correctly, all tasks demand certain knowledge and attitudes from workers (Norton, 1991). The DACUM process consists of four components namely: 1) the selection of workshop participants; 2) the DACUM workshop; 3) data analysis; and 4) the development of the course. The participants in the workshop should be experts in their respective areas of specialization, articulate and forward thinking.

- The DACUM workshop

Norton (1991) says the DACUM workshop brings together all experts and provides the topic for identifying a competency analysis profile content framework with consultation and negotiation of competency-based curriculum. The DACUM workshop includes the themes of Automotive Technology Profile through the National Skills standards Board of America that proposes a common framework, as shown in figure 1, to be followed by each state or industry sector which desire to develop standard. Researcher was moderator, explained about the overview of skills standard framework. Therefore, started at 1) Occupational title was synonymous to job title, which specifies the domain of competency standards. 2) Critical work function, equivalent to collective competency, was the major responsibility in a job area. 3) Key activity, synonymous to a single skill, is the major duty or task involved in carrying out a critical work function. 4) Performance indicator provides information on how to determine when someone was performing each key activity competently. 5) Technical knowledge was the related knowledge needed to perform the key activity. 6) Employability knowledge and skill was a general competency used to improve performance of the key activity.

RESEARCH METHODOLOGY

Figure 1 shows the approach that *ibstpi* (The International Board of Standards for Training, Performance and Instruction) has followed to develop and validate competencies (Klein & Richey, 2005). In addition, researcher would like to propose competency development concept which involved identifying the knowledge, skills, attitudes, capabilities, and tasks associated with a particular job role such as instructional design. The first one is defined; current practices and existing standards are identified to curricular content through competency (knowledge and skills). Furthermore, the ethics and values commonly used to evaluate performance-related behaviours must also be determined (Attitudes). Finally, a vision of the evolving nature and the future job role is articulated. Current practice, existing standards, ethics, values, and a vision of the future collectively provide the major input into the identification and validation of knowledge, skills, and attitudes believed to be critical to effective performance in a particular job role. Researcher applied this competency model, and modified it on conceptual framework to construct a competency analysis profile.

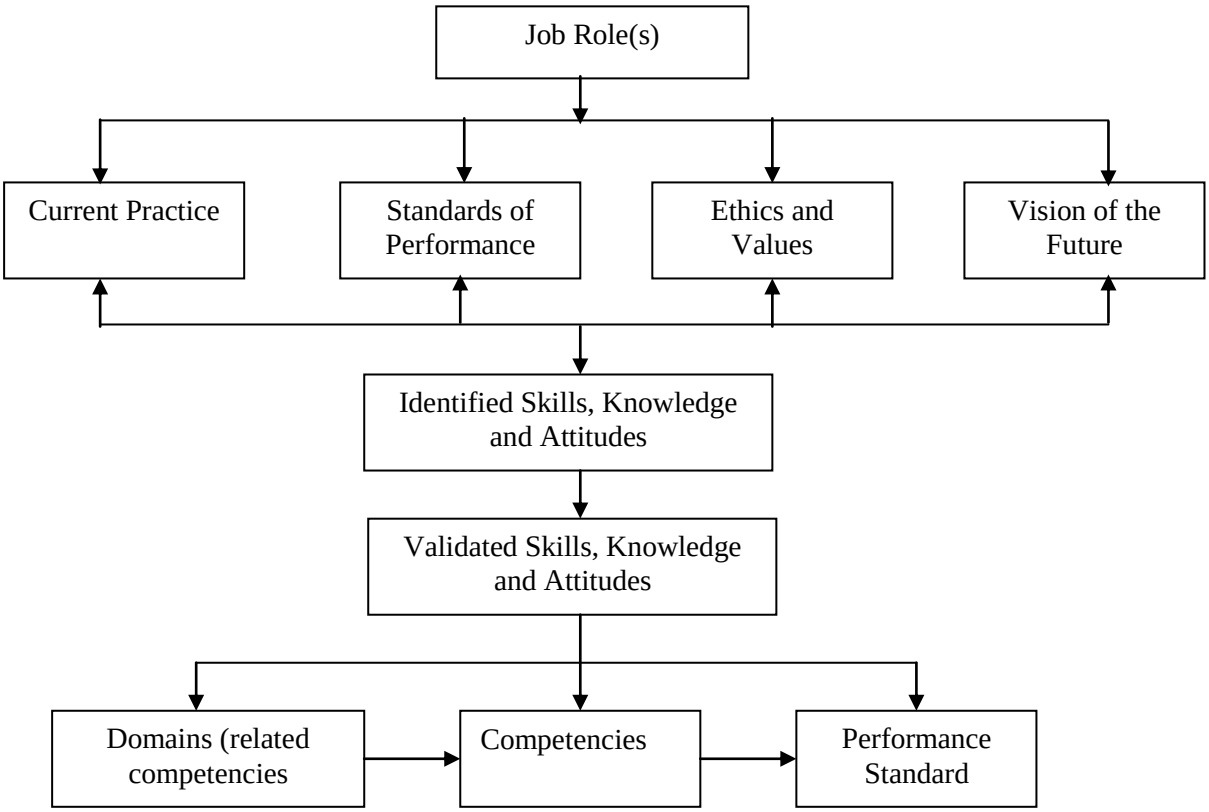

Figure 1: *The ibstpi competency development model*

The qualitative and quantitative data was collected through observations, in-depth interviews, document analysis, and DACUM (Developing a Curriculum) job analysis process with 17 training instructors from 12 well-known car automobile companies in Thailand. The triangulation method was referred to validate an automotive technology competency analysis profile (Creswell, 2008). The triangulation method is the strategy the researcher used to collect data of corroborating evidence from different individuals (e.g., training instructors and automotive service technicians), types of data (observations and in-depth interviews), and methods of data collection (e.g., document analysis and in-depth interviews) in description and theme in this study.

Common techniques of data gathering are in-depth interview, documentary analysis, and on-site observation. Just using these techniques produce a questionnaire for interpreting the reliability of a competency analysis profile. As analytic descriptions or reconstructions of training instructors symbolic meanings and pattern of utilize tools into research design. Researcher was also conducted in Figure 2. Furthermore, accuracy of the finding are varied terms that researcher use to describe, and strategies used to validate qualitative accounts vary in number (Creswell & Miller, 2000).

Research was designed and adapted according to Spencer and Lyle (1983), since the content validity co-responded to the present study and development model. Only two concepts were selected and synthesized: the classic study design using criterion samples and a short study design using expert panels that can be applied in Figure 2.

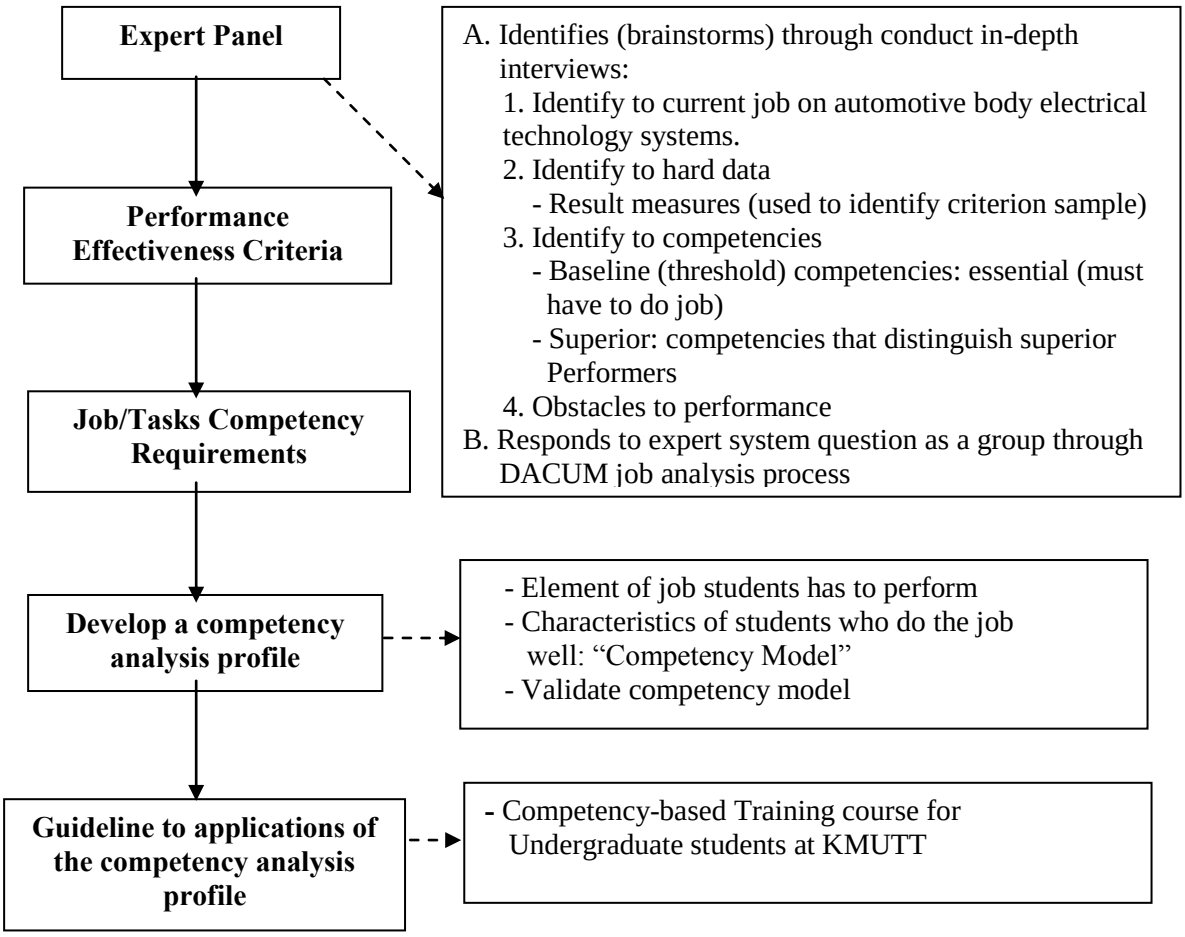

***Figure 2**: Designing of Competency Analysis Profile Process*

The training instructors identified the general areas of job responsibilities called duties (typically 8-12 per job), then specified tasks (competencies) performed in connection with each duties (typically 75-125). Modified and structured small group brainstorming techniques are used to obtain the collective expertise and consensus of the training instructors. High quality task and duty statements usually result from this interaction. The three-day DACUM workshop was held in September 2007 at Department of Mechanical Technology Education at KMUTT. Researcher is a trained DACUM facilitator and conducted the workshop.

RESULTS

The results have shown by proposing the following students' competencies that identified and verified by a panel of subject matter experts currently employed in the field of Automotive Technology Education. The competency analysis profile of automotive body electrical technology system is divided into 7 job duties, 86 tasks and 7 core competencies framework. This panel of experts has determined that these skills will adequately prepare students for entry level positions in the context of automotive body electrical technology systems. This study is developed into modules which each in core competencies are included to guide and identify the knowledge, skills and attitudes students need to perform each competency. Core competencies are designed to be the basis for training programs to ensure stakeholders input what is relative and meaningful to the workplace. This competency intended to include all basic, necessary skills for this area, but may be supplemented with additional competencies as essential as students' competency and the ability to service, repair and diagnosis.

Experts are identified to train effectively in three categories:

1. Competency - an observation and measurable behaviour that has a defining beginning and end; can be performed within a limited amount of time; consists of two or more core competencies; and leads to a product, service, or decision.
2. Core competencies – the skills, knowledge, and attitudes (written in measurable terms) needed to perform a given competency.
3. Entry level – position of stakeholders that requires no previous experience, but may require some training and/or specific knowledge, skills, and attitudes. All tasks have the skills level designation recognize program content requirements which vary by program type and regional subject taught.

Therefore, flexibility has been built into the list by assigning each task the skills level. The skills level number simply indicates the minimum in their program in order to be taught in that area. It assigned 1 of 3 skills level:

1. Elementary Skills Level (E-1) items must be taught in the training program ninety-five percent (80%).
2. Intermediate Skills Level (I-2) items must be taught in the training program eighty-five percent (70%).
3. Advanced Skills Level (A-3) items must be taught in the training program seventy percent (50%).

In each module, researcher collected data based on the conceptual framework of Duffy (1998). Training instructors were determined with a questionnaire in each module. The content analysis was improved to correct and appropriate in the context of now automotive technology. This study was a pilot project conducted by MTE program at KMUTT. The result revealed that:

Module 3: Automotive Body Electrical Systems

Job Duty 3.1 General Automotive Body Electrical System Diagnosis

Task lists:

3.1.1	E-1	Interpret and verify shop safety rules and procedures
3.1.2	E-1	Interpret and verify environmental protect, energy conservations, public mind, and procedures
3.1.3	E-1	Inspect the procedure as follow as instructional module
3.1.4	E-1	Check and prepare tools, equipment, and materials correctly
3.1.5	E-1	Read and use wiring harness diagram of body electrical circuits problems
3.1.6	I-2	Check electrical circuits with a test lamp; determine necessary action
3.1.7	E-1	Check voltage/voltage drop, current, resistance in body electrical circuits and components by using an analog multimeter (AMM) and a digital multimeter (DMM); determine necessary action
3.1.8	E-1	Check current flow in body electrical circuits and components by using ammeter; determine necessary action
3.1.9	E-1	Check continuity and resistances in body electrical circuits and components by using ammeter; determine necessary action
3.1.10	I-2	Explore shorts, grounds, open-close circuit, and resistance problems in body electrical circuits and components; determine necessary action
3.1.11	E-1	Repair wiring harness, sockets, and connectors body of electrical circuits and components
3.1.12	E-1	Perform solder repair of electrical wiring damage
3.1.13	E-1	Measure and diagnose the cause(s) of abnormal key-off battery drain; determine necessary action
3.1.14	E-1	Inspect and test power sources, fusible links, circuit breakers, and fuses; determine necessary action
3.1.15	E-1	Inspect and test switches, connections, relays, and wires of body of electrical circuits and components; perform necessary action

3.1.16	A-3	Diagnosis the cause of power sources, control equipment, and components with instructional manual
3.1.17	A-3	Complete written report (e.g., results, discuss, recommendations, conclusions and suggestions) to be guideline for improving skills in problem-solving, creativity, and decision making

Job Duty 3.2 Battery Diagnosis and Service

Task lists:

3.2.1	E-1	Describe the general safety rules pertaining to battery diagnosis and service
3.2.2	E-1	Interpret and verify environmental protect, energy conservations, public mind, and procedures
3.2.3	E-1	Inspect the procedure as follow as instructional module
3.2.4	E-1	Check and prepare tools, equipment, and materials correctly
3.2.5	E-1	Check and select battery recharges with charging equipment; determine needed service
3.2.6	E-1	Pre-caution and maintain or restore electronic memory functions
3.2.7	I-2	Inspect, clean, distillation fill, and replace battery
3.2.8	E-1	Perform slow/fast battery charge
3.2.9	I-2	Inspect and clean battery cables, connectors, clamps, and hold-downs
3.2.10	A-3	Perform jumper cables with auxiliary power supply according to manufacturers recommended specifications
3.2.11	A-3	Perform hydrometer to read specific gravity of sulphuric acid; determine needed service
3.2.12	A-3	Complete written report (e.g., results, discuss, recommendations, conclusions and suggestions) to be guideline for improving skills in problem-solving, creativity, and decision making

Job Duty 3.3 Starting System Diagnostic and Repair

Task lists:

3.3.1	E-1	Describe the general safety rules pertaining to diagnosis and repair starting system
3.3.2	E-1	Interpret and verify environmental protect, energy conservations, public mind, and procedures
3.3.3	E-1	Inspect the procedure as follow as instructional module
3.3.4	E-1	Check and prepare tools, equipment, and materials correctly
3.3.5	E-1	Verify and interpret starting system concern by duplicating instruction manual
3.3.6	E-1	Perform starter current draw tests
3.3.7	E-1	Perform starter circuit voltage tests
3.3.8	I-2	Inspect and test starter relays, solenoids, clutch, gear train; perform necessary action
3.3.9	A-3	Remove, install and clean starter
3.3.10	A-3	Perform starter bench test, furthermore, ground leak test, winding damage, armature damage, ball bearing, carbon brush, magnetic fields, thrust washer, and bench tests; determine necessary action
3.3.11	A-3	Inspect and test control equipment (e.g., ignition switch, connectors, and starter circuit; perform necessary action
3.3.12	A-3	Complete written report (e.g., results, discuss, recommendations, conclusions and suggestions) to be guideline for improving skills in problem-solving, creativity, and decision making

Job Duty 3.4 Charging System Diagnostic and Repair

Task lists:

3.4.1	E-1	Describe the general safety rules pertaining to diagnosis and repair charging system
3.4.2	E-1	Interpret and verify environmental protect, energy conservations, public mind, and procedures

3.4.3	E-1	Inspect the procedure as follow as instructional module
3.4.4	E-1	Check and prepare tools, equipment, and materials correctly
3.4.5	E-1	Verify and interpret charging system concern by duplicating instruction manual
3.4.6	E-1	Perform charging system output test by using ammeter; determine necessary action
3.4.7	E-1	Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions according to manufacturers recommended specifications
3.4.8	I-2	Inspect, adjust and replace alternator drive belts; perform necessary action
3.4.9	I-2	Inspect and test voltage regulator (manual/electronics) circuit; perform necessary action
3.4.10	I-2	Perform alternator bench test, furthermore, ground leak test, winding damage, armature damage, ball bearing, carbon brush, rotor/stator core, diodes/rectifier sets, and bench tests; determine necessary action
3.4.11	I-2	Remove, inspect, and install alternator
3.4.12	A-3	Disassembly alternator, clean, inspect and test performance; determine necessary action
3.4.13	A-3	Perform charging circuit voltage drop tests; determine necessary action according to manufacturers recommended specifications
3.4.14	A-3	Complete written report (e.g., results, discuss, recommendations, conclusions and suggestions) to be guideline for improving skills in problem-solving, creativity, and decision making

Job Duty 3.5 Lighting Systems Diagnosis and Repair

Task lists:

3.5.1	E-1	Describe the general safety rules pertaining to diagnosis and repair lighting systems
3.5.2	E-1	Interpret and verify environmental protect, energy conservations, public mind, and procedures
3.5.3	E-1	Inspect the procedure as follow as instructional module
3.5.4	E-1	Check and prepare tools, equipment, and materials correctly
3.5.5	E-1	Verify and interpret lighting systems concern by duplicating instruction manual
3.5.6	E-1	Identify the type of bulbs, illuminate capacity, and reflectors; determine necessary action
3.5.7	E-1	Explore the position of power sources, control equipments, and component of lighting systems; determine necessary action
3.5.8	I-2	Measure and diagnose the cause(s) of abnormal bright (e.g., brighter than normal, intermittent, dim, or no light operation; perform necessary action
3.5.9	I-2	Inspect, replace and aim headlights and bulbs; perform necessary action
3.5.10	A-3	Inspect and diagnose incorrect (e.g., park light, stop light, turn signal light, hazard light, room light, and etc.) operation; perform necessary action
3.5.11	A-3	Complete written report (e.g., results, discuss, recommendations, conclusions and suggestions) to be guideline for improving skills in problem-solving, creativity, and decision making

Job Duty 3.6 Instrument Cluster Systems Diagnosis and Repair

Task lists:

3.6.1	E-1	Describe the general safety rules pertaining to diagnosis and repair instrument cluster systems
3.6.2	E-1	Interpret and verify environmental protect, energy conservations, public mind, and procedures
3.6.3	E-1	Inspect the procedure as follow as instructional module
3.6.4	E-1	Check and prepare tools, equipment, and materials correctly
3.6.5	E-1	Verify and interpret instrument cluster systems concern by duplicating instruction manual

3.6.6	E-1	Inspect and test instrument cluster (e.g., gauges, gauge sending units, engine fault/MIL, and etc.) for cause of intermittent, high, low, or no gauge reading; determine necessary action
3.6.7	E-1	Diagnose the cause of incorrect horn operation; perform necessary action
3.6.8	I-2	Diagnose the cause of wiper operation; diagnose wiper speed control and park control problems; perform necessary action necessary action
3.6.9	A-3	Complete written report (e.g., results, discuss, recommendations, conclusions and suggestions) to be guideline for improving skills in problem-solving, creativity, and decision making

Job Duty 3.7 Accessories Systems diagnosis and repair

Task lists:

3.7.1	E-1	Describe the general safety rules pertaining to diagnosis and repair accessories systems
3.7.2	E-1	Interpret and verify environmental protect, energy conservations, public mind, and procedures
3.7.3	E-1	Inspect the procedure as follow as instructional module
3.7.4	E-1	Check and prepare tools, equipment, and materials correctly
3.7.5	E-1	Verify and interpret accessories systems concern by duplicating instruction manual
3.7.6	E-1	Inspect and test accessories systems (e.g., seat, power window, power door lock, power mirror, and sound) for cause of intermittent, high, low, or no operating; determine necessary action
3.7.7	I-2	Diagnose the cause of incorrect of motor-driven accessory circuits; perform necessary action
3.7.8	I-2	Diagnose the cause of heated glass, power door lock, power mirror; perform necessary action
3.7.9	I-2	Diagnose the cause of radio and sound audio static and weak, intermittent, or no radio reception; determine necessary action
3.7.10	A-3	Identify the cause of supplementary restraint system (SRS) and other passive and active tests for safety systems (theoretical discussion)
3.7.11	A-3	Complete written report (e.g., results, discuss, recommendations, conclusions and suggestions) to be guideline for improving skills in problem-solving, creativity, and decision making

A competency analysis profile on automotive body electrical technology systems describes the core competencies framework for training program on automotive technology subjects provide opportunities to develop, reinforce, and apply. It consists of 7 core competencies framework:

1. Numeracy skills as they calculate, estimate, and measure;
2. Information skills as they identify, locate, gather, store, retrieve, process, discuss, and present information;
3. Communication skills as they apply general education within technology to communicate and generate ideas, solutions, reflections, and produces;
4. Problem-solving skills as they identify, describe, and analyse problems, and test their ideas and solutions through applied cognitive approach, psychomotor approach, and affective approach;
5. Social and cooperative skills as they interact with others to solve problems and complete projects;
6. Leadership and career professional teacher skills as they set goals, plan, address challenges, resolve conflicts, and code of conduct; and
7. Competencies as they carry out technological tasks using tools, equipment, and materials correctly, safety, effectively, and efficiently.

The task verification questionnaire consisted of the list of actual duties and tasks performed by entry-level training instructors in automotive engine service, repair and diagnosis as identified through the DACUM process. Respondents were asked to indicate the importance of each task and how frequently each task is performed by entry-level training instructors using a three-point Likert's Rating scale

(Essential = 5, Important = 3, and Not Important = 1). Analysis of the responses was referred to validate an automotive technology competency analysis profile. The only 7 items received a mean rating of 4.0 to 5.0 a range defined as essential, being the highest rating. These essential duty and task statements need all items. Also included in the task verification questionnaire was the list of competencies required for training instructors. The importance of 56 core competencies as rated by respondents and the mean rating was calculated for each competencies item. Items with a mean rating of 4.0 to 5.0 were considered essential to the automotive technology competency analysis profile on automotive technology course of MTE undergraduate program at KMUTT. Items with a mean rating of 3.5 to 3.9 were classified important.

The essential guidelines to implement a competency analysis profile in the context of automotive body electrical technology systems. Training instructors' consensuses the competencies/outcomes must be specifically articulated and individually addressed in terms of how the learner will acquire the desired knowledge, skills and attitudes, and how acquisition of that competency will be represented into five stages: (Acntenhagen, 2001; Arguelles & Gonczi, 2000; Barnett, 1994; Samuelowicz, 2001)

Stage 1: First is a needs analysis, in which actual needs are determined and sound of social demands, for improve curriculum, for updated automotive technology, for change in automotive procedures, or some combination of needs. If the need for training is confirmed, a job analysis is next (the DACUM approach recommended). Next is task verification, which can extend involvement in the job analysis from experts' workers and can provide a means of rating the importance and difficulty of each task and obtaining other valuable decision-making information. It provides into sixth components:
1.1 Conduct needs analysis
1.2 Conduct job analysis
1.3 Conduct task verification
1.4 Select tasks for training
1.5 Conduct standard task analysis
1.6 Conduct literacy task analysis

Stage 2: Based on information collected in stage 1. The instructional programs and materials to be developed, which instruction will be individualized, and support instructional media. The development of learning must focus on objectives for each task or group of tasks, followed by the competency analysis profile. Then, the development of learning can apply to student competency measures. It provides into fourth components:
2.1 Determine training approach
2.2 Develop learning objectives
2.3 Develop performance measures
2.4 Develop training plan

Stage 3: Should develop main components, although depending on the type of materials to be produced. It provides into sixth components:
3.1 Perform competency profile
3.2 Draft learning guides/modules
3.3 Construct learning aids
3.4 Construct curriculum guide/lesson plan
3.5 Construct supportive media
3.6 Pilot-test/revise materials

Stage 4*:* It provides into fourth components:
4.1 Implement training plan
4.2 conduct training
4.3 conduct formative evaluation
4.4 document training

Stage 5: The final stage should be done the formative evaluation complete. The important step is to conduct the summative evaluation to collect data for use in decisions on maintaining or improving the education. This involves gathering data on the overall instructional process, program outcomes, student follow-up, and cost-effectiveness. Completion of the evaluation stage produces the performance data and feedback vital to any education or training system concerned with quality and improving its worth. It provides into third components:
5.1 Conduct summative evaluation
5.2 Analyse information collected
5.3 Initiate corrective actions

DISCUSSIONS

This study focused on an automotive technology competency analysis profile for training undergraduate students of Mechanical Technology Education program at King Mongkut's University of Technology Thonburi. This result identified strategies for constructing and implementing automotive body electrical technology systems. An automotive technology competency analysis profile is identifying the tasks required of competent undergraduate students in each automotive body electrical technology system. These task lists (content standards) are continually validated by industry-based teams from 12 well-known car automobile companies in Thailand, and therefore represent state-of-the-art service procedures. The competency analysis profile was also included in the standards for implementing equipment, facilities, staff, and institutional support. Additionally, the academic skill content has been identified through a rigorous process for inclusion in materials.

There were 7 job duties, 86 tasks and 7 core competencies framework. Only 5 items received a mean rating of 4.0 to 5.0 a range defined as essential, being the highest rating. These essential duty and task statements need all items. Also included in the task verification questionnaire was the list of competencies required for training instructors. The importance of 56 core competencies as rated by respondents and the mean rating was calculated for each competencies item. Items with a mean rating of 4.0 to 5.0 were considered essential to the automotive technology competency analysis profile on automotive technology course of MTE undergraduate program at KMUTT. Items with a mean rating of 3.5 to 3.9 were classified important. Furthermore, the specifically designed it cross the competencies by applied from entry level, assigned 1 of 3 skills level.

Researcher found that a precise language to specify performance. The precision involves the consistent use of an "action verb" as the beginning word. The action verb, also called active verb, was a transitive verb had the meaning of acting, performing, or executing, and always provides important information about the content of a competency. An action verb was usually used to describe skill, competency, basic academic ability, educational objective, curriculum design, learning assessment, learner profile, curriculum vitae, and recruitment advertisement. An action verb also needs an object. The object, a noun or a noun phrase, is the performing target of the action verb. Aside from this, it may need to specify the condition or circumstance to increase precision. Hence, a competency statement had the form of "action verb + object + condition" that can be proposed in Figure 3 (Mansfield & Mitchell, 1996; Norton, 2004).

Occupational Title: occupational name in industry sectors
Critical Work Function: main responsibilities associated with occupational
Key Activity: identifiable and measurable competencies
Performance Indicator: effective performance in key activity
Technical Knowledge: knowledge associated with key activity
Employability knowledge and skill: general competencies for key activity

Figure 3*: Skill Standards Framework of America*

It was provided the themes of automotive technology profile through the National Skills standards Board of America that proposes a common framework, as shown in figure 1, to be followed by each state or industry sector which desired to develop standard. Researcher was moderator explained about the overview of skills standard framework. Therefore, started at 1) Occupational title was synonymous to job title, which specifies the domain of competency standards. 2) Critical work function, equivalent to collective competency, was the major responsibility in a job area. 3) Key activity, synonymous to a single skill, is the major duty or task involved in carrying out a critical work function. 4) Performance indicator provides information on how to determine when someone was performing each key activity competently. 5) Technical knowledge was the related knowledge needed to perform the key activity. 6) Employability knowledge and skill was a general competency used to improve performance of the key activity.

Consequently, the tools for success on competency-based education that Oklahoma Department of Career and Technology Education (2006) can be described as three components to deliver competency-based instruction. It consists of skills standards, curriculum materials, and competency assessments. On the other hand, social and cooperative skills, leadership and career professional teacher skills, and numerical skill were rated as essential and important for MTE undergraduate programs at KMUTT.

This competency analysis profile is critical to competent performance by quality undergraduate students. This is also the basis for the integration of higher education and contextual or applied learning. The significant points can be proposed as follows:

1. Students must continually adapt to changing competency and technology as automotive components and systems become increasingly sophisticated.
2. Dual training programs between university and enterprise is the best preparation for these challenging technology-based learning.
3. Opportunities should be done for students with operation to current situation or relative jobs. The essentially skills as well as diagnostic and problem-solving skills, knowledge of electronics and instrumentation aptitude.

The successful realization of competency-based education heavily relies on the teachers, who are expected to give up their role as ‘knowledge transmitter’ and adopt the new role of ‘coach’ (Enkenberg, 2001; Kerr, 1996; Pratt, 1998; Samuelowicz, 2001), and ‘instructional designer’ (Tennyson, 2001). Researcher hopes that this research has begun to address some significant educational challenges of automotive technology performing. A thorough systematic curriculum and instructional development has resulted in establishment of clear, realistic and justifiable competency analysis profile. This comprehensively will facilitate common standards of training and professional practice which are an iterative approach to training program development. These reasons provide a universal structure for training and assessment of automotive technology on competency-based educational development.

Suggestions

The following suggestions were derived from the results and analysis of this research:

1. The automotive technology competency analysis profile, which has been developed in this research, can be used to improve capability and establish training programs. It may be quicker and more effective to finish establishing the necessary competency analysis profile.
2. Each automotive technology competency analysis profile identifies the competencies needed to enter a given automotive technology area.
3. The automotive technology competency analysis profile not only lists the competency but also clusters those competencies into broader instructional modules and details the knowledge, skills, and attitudes (students’ competencies) needed to perform each competency.

4. Within the competency list are two levels of items: core competency and core skills. Core competency items, which are essential for entry-level students, are required to be taught. Core skills items are those needed to integrate for increasing activity in the identification and verification of additional items.

RECOMMENDATIONS

The recommendations that the two delivery methods were similar in terms of final learning outcomes:

1. Instructional system design through modules and focuses on performance-based, individual paced needs and learning in the field with assistance of a resource person.
2. Assessment and evaluation should be applied by the authentic method through objective criterion, criterion-referenced and student competencies.
3. Training strategies should be applied by learning with technology and high-end tools for operating that affected to manipulate and accuracy.

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Appendix A: A questionnaire for important duty and tasks analysis through DACUM process

Duty and Task Statements	Importance Mean
1. **General Automotive Body Electrical System Diagnosis**	4.63
Tasks 3.1.1 - 3.1.17	4.37
2. **Battery Diagnosis and Service**	4.14
Tasks 3.2.1 – 3.2.12	3.87
3. **Starting System Diagnostic and Repair**	4.95
Tasks 3.3.1 – 3.3.12	4.77
4. **Charging System Diagnostic and Repair**	5.00
Tasks 3.4.1 – 3.4.14	5.00
5. **Lighting Systems Diagnosis and Repair**	4.92
Tasks 3.5.1 – 3.5.11	4.47
6. **Instrument Cluster Systems Diagnosis and Repair**	4.26
Tasks 3.6.1 – 3.6.9	4.12
7. **Accessories Systems diagnosis and repair**	4.17
Tasks 3.7.1 – 3.7.11	4.06

Note. *Important duty and tasks analysis were rated on a 3-point scale. Essential = 5, Important = 3, and Not Important = 1.*

Appendix B: A questionnaire for task verification to core competencies ratings through DACUM process

Duty and Task Statements	Importance Mean
1. Numeracy skills:	
Calculus	4.27
Linear algebra	3.54
Diffential equations	3.51
Statistics	4.62
Precision instrumentation	4.93
2. Information skills:	
Identify	4.78
Locate	4.63
Gather	4.17
Store	4.95
Retrieve	4.78
Process	4.91
Discuss	4.73
Present information	4.88
Technical writing	4.56

Appendix B: A questionnaire for task verification to core competencies ratings through DACUM process (continued)

Duty and Task Statements	Importance Mean
3. Communication skills;	
English language and others	5.00
Learning by technology	5.00
Oral communication	4.61
Self – direct learning	3.64
Reflections	3.54
Produces	3.90
4.Problem-solving skills;	
Identify	4.85
Describe	4.76
Step for analyse problems	5.00
Multidisciplinary	5.00
Critical Thinking	4.85
Creative Thinking	4.63
System Thinking	5.00
Hands on experience	5.00
5. Social and cooperative skills;	
Interpersonal	4.87
Organizations	4.62
Self – awareness	5.00
Time management	4.79
Ethics	5.00

Team building	4.86
6. Leadership and career professional teacher skills;	
Set goals	4.23
Plan address	4.36
Challenges	4.69
Resolve conflicts	4.47
Code of conduct	4.94
7. Competencies;	
Using basic tools	5.00
Using special tools	5.00
Using equipment	5.00
Using supplementary materials	4.89
Correctly	4.81
Cleanly	5.00
Safety	5.00
Effectively	5.00
Efficiently	5.00
Integration	5.00

Note. *Important duty and tasks analysis were rated on a 3-point scale. Essential = 5, Important = 3, and Not Important = 1.*

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Establishing and Sustaining School Leader Networks through Computer Supported Collaborative Learning

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ABSTRACT

Two goals of the university's postgraduate programme in educational management and leadership is; (a) to establish a learning support network amongst each cohort in order to stimulate ease and openness of professional sharing and so enhance course learning; and (b) to promote sustainable school leader networking in the field.

'Moodle', a recently introduced computer supported collaborative learning (CSCL) technology, uses asynchronous discussion forums to create opportunities for professional and social support which are intended to complement face-to-face meetings. Such discussion forums are immediately helpful for providing personalised advice when needed ('just for me; just in time' support) to the school leaders who have been away from tertiary study for some time and have grown unfamiliar with juggling personal, professional and student life.

Long term, these discussion forums will hopefully stimulate the school leaders to establish and sustain their own online forums once their study is completed and they are back out in the field. Such an 'anywhere anytime' support network would be especially helpful for newly appointed school leaders and those in isolated areas.

Appropriately moderated asynchronous threaded discussions that are interspersed with face-to-face meetings require a teaching methodology that emphasises active student-centred problem-based collaborative learning, in order to improve discussion structure and team problem solving, and develop a communal sense of professional learning.

This same innovation also supports the university's partner, the Ministry of Education, by helping it establish professional knowledge communities amongst school leaders at cluster and district levels in order to align systemic vision and school-based improvement action plans.

This paper contains; a rationale for using an online professional discussion forum to establish a hybrid professional community of practice; a description of the 'moodle' technology; establishing the technology in and existing on-campus leader development course; ensuring a positive initial response to the technology; and efforts to sustain the hybrid school leader support network.

Keywords: moodle, computer supported collaborative learning (CSCL); moderated asynchronous threaded discussions; hybrid professional knowledge communities; communities of practice; sustained collaborative professional support networks; distributive management and leadership; systemic alignment.

INTRODUCTION

School leaders are the key drivers of school improvement and to align improvements across an educational system, it makes sense that they stay aligned in their vision and development strategies.

By forming their own district and cluster school leader networks, school leaders can develop a sharing culture built on trust and effective communication to cooperatively imagine aligned visions and collaboratively realise their aligned goals (Kochan and Reed, 2005).

However, due to the impact of administrative commitments, the school leaders in Brunei Darussalam meet to discuss administrative matters rather than to work as a team on any particular school or systemic improvement project or to improve themselves via professional sharing.

This administrative rut does not have to be the case for these professional educational leaders. By incorporating asynchronous threaded discussion forums that are interspersed with face-to-face meetings, the school leaders can collaboratively plan and execute team projects, seek support from diverse experts locally and even internationally, work across isolated rural areas, and communicate at a time and from a place that conveniently matches each school leaders' busy daily schedule. Such a group working collaboratively face-to-face as well as online is called a hybrid community.

The technology used by the particular hybrid community discussed in this paper is an open-source course management system, also called learning management system. It is called 'moodle' (Moodle Homepage, 2008) and incorporates the full range of useful facilities that are required to conduct a full course including a repository for course content materials, assignments and individual and group tasks, asynchronous discussion forums and synchronous chat functions, as well as assessment facilities and student databases.

RATIONALE FOR THE USE OF A HYBRID LEADER DEVELOPMENT FORUM

The school leaders participating in the particular hybrid community that is discussed in this paper were involved as part of their coursework in a postgraduate course on educational leadership. They were being introduced to hybrid professional communities for the first time and it was the hope of the coordinator of the programme that they would have a positive experience and would appreciate the potential opportunities available to them if they formed hybrid school leader networks amongst their cluster or district groups once they finished their postgraduate programme and were back as practicing administrators in their schools and in Ministry.

Deployment of a hybrid professional community over other forms of discussion groups was chosen because they were beginner level online discussion forum users and needed the face-to-face contact to maintain the professional relationship and to collaboratively solve any technical problems associated with using online environments. The asynchronous form of online discussion was implemented because their work environment is often characterised by busy daily schedules and diverse geographical locations. Lund (2004) points out that physical proximity in face-to-face communication and teleproximity as in asynchronous online communication both influence the each other and both create a sense of group awareness in hybrid discussion forums.

In face-to-face meetings, the school leaders were well prepared to be candid, sociable and simultaneously more focused on the meeting tasks. However, their online communication was mainly limited to email or use of the telephone. The hybrid format allowed them to familiarise with online discussion forums whilst simultaneously being able to strengthen the discussion and solve any difficulties with the online process during face-to-face sessions. The importance of this socio-emotional process is supported by Kreijns and Kirschner (2004) in their argument for developing a sociable technological design into discussion forums.

During their usual workplace face-to-face school leader meetings, their district officers reported that their communication with other school leaders was mainly composed of administrative tasks rather than professional sharing and growth. Presumably this was because they have so much administrative business to discuss and so little face-to-face communication time for more professional development matters, due to lack of regularity of meetings because of geographical isolation.

Lund (2004) reported that the opportunity to use asynchronous online forums can alleviate these hindrances because of the nature of human support that is provided in such online forums. Online communication allows the school leaders more time because they can choose to communicate at a time and a place that suits them. Asynchronous communication usually involves weighing up the topic and putting forward a considered view making the process toward knowledge production and sharing more efficient and effective. This results in the school leaders having more time to complete their administrative tasks and move on to the important professional sharing communication.

Kreijns and Kirschner (2004) point out that the hybrid discussion forum can incorporate real-life problem solving opportunities, along with a direct knowledge, skill and relationship link with other colleagues leading to professional sharing and interpersonal relationship development in organisations. The hybrid format allows face-to-face opportunities to physically interact and develop their practical leadership capacities and to continue such leadership teamwork online. Online discussion forums also permit a non-confrontational environment for sharing their reflections on their leadership growth and thus reinforcing and further enhancing individual and group development. Such practical knowledge and skill development is considered essential to current approaches to leadership development.

COMPUTER SUPPORTED COLLABORATIVE LEARNING (CSCL) – MOODLE

The technology used to support this particular hybrid leader development strategy in a freeware open-source product called Moodle (Moodle Homepage, 2008). Moodle is a course management system that has been based on a constructivist teaching and learning approach. This means that its facilities support a learner-based approach to carrying out tasks. It is also social constructionist in that it supports collaborative learning and task completion through its member accessibility and the openness of its asynchronous discussion forums. Such a pedagogical design made it appropriate for use in supporting a small group of school leaders in their attempt to extend their collaborative issue discussion sessions, decision-making, problem-solving and general professional and personal support online so that they can access each other as a group anytime anywhere and even invite outside experts into their group if need be.

The Moodle course management system is open source software and is free. To initiate a course coordinator or group leader simply needs to download the programme from the Moodle site and set up space on a server that supports the Moodle software. If the company does not have access to its own server, it costs very little to rent server space on a commercial server that supports Moodle and there are many such servers available on the internet, one being http://www.hostmonster.com Because the server is on the internet, all data is stored on the internet which saves storage space on users' private computers. As well, access is available 'anytime anywhere' to the internet website.

Moodle is a relatively easy to use learning management system. Its graphical user interface (GUI) functions similar to Microsoft Windows © products and so appears familiar from the initial use. This makes readiness for use relatively simple. Each participant simply logs on to the Moodle site that is prepared by the course coordinator, reads the particular weekly topic and instructions and initiates or adds to the topic discussion and carries out any required tasks, and then logs off.

Being open source software means that many practitioners are continually offering suggestions and improving the programme so that its design structure is continually becoming more user-friendly, practical, effective and efficient. The programme is intuitively and logically designed for administrator usage in preparing, teaching, resourcing and evaluating courses. It is also intuitively and logically designed for participant usage in individual and collaborative learning, interacting and forming relationships online.

The online site is password secure. This makes the online activities open only to the administrator and the participants. Discussion content is only available to the administrator and participants of any

particular group. Assignment and emails are only for those intended. Participants should feel confident in being able to participate openly and thus build trust amongst their group. This sense of security also helps bond the group and supports a sustained school leader network.

HYBRID LEADER DEVELOPMENT STRATEGY

In this particular hybrid course in practical leader development, there were four set activities on a set topic each week. During any particular week, there was a face-to-face lecture by the coordinator, a face-to-face participant-led seminar/discussion, an online asynchronous discussion forum, and a reflective summarising task, which was called the reflective diary of leadership learning and was uploaded by each participant.

All four activities focused on the same set leadership topic which changed each week. The course catered for individual learning styles because, each week, the students experienced four different learning styles. For example, the first weekly topic was 'Visualising Leadership'. This particular introductory task required each participant to visualise the leadership qualities of well known leaders whom they respected and discuss what characteristics and style made this person respected.

At the end of each week, each participant reflected on and summarised their group's understandings and opinions on the topic and uploaded a one page written word document to the course coordinator who is called the forum administrator. Upon completion of the fourteen week course, the participants collated their fourteen weekly discussion summaries and uploaded this as one of their course assignments. This reflective summarising task was the reflective diary of leadership learning.

This weekly procedure was repeated each week covering fourteen leadership topics. Content-wise, the participants covered fourteen leadership topics during the course. However, just as importantly, process-wise, they repeated the online experience of personally and professionally participating in an online professional learning and problem-solving school leader network at least fourteen times.

This experience was complemented in the face-to-face learning context with the course coordinator initiating on-campus discussions on what, how, and why, the school leaders were participating in the online discussion forum. This meta-learning was carried out in order to connect the forum experience with the programme goal to establish and sustain school leader networks as part of their usual school leader cluster and district groups once back in their schools.

ESTABLISHING POSITIVE INITIAL RESPONSES

Research by Kreijns and Kirschner (2004) and Lin and Overbaugh (2007) shows that although the utility of asynchronous online discussion forums is obvious, the communication format lacks much of the social context required for effective collaboration.

Although a social context was generated to a certain level online, the course delivery established an initial positive response via a hybrid face-to-face/asynchronous online environment by beginning the professional discussion forum face-to-face and following-up with an online format. In this way, both environments sustained each other.

In the leadership course, participants were encouraged to use the possibilities that are built into the design of the hybrid discussion forum to maximise ease of use and to gain maximum leverage in collaboratively achieving their quest for leadership growth and course task completion.

The coordinator provided a user friendly learning environment with both support and challenge through the technology. Computer supported collaborative learning (CSCL) facilitated the communication of knowledge and the construction of knowledge. Such an approach allowed greater

relevancy to all members due to the use of different learning styles, greater divergence of discussion resulting in more perspectives on the topic and thus a fuller meaning and understanding of the topic.

The technology also created a common environment which acted as a common platform for discussion. Knowledge and learning was generated from a process of individual and group critical self-reflection. The instructor designed a threaded discussion topic with a central theme in which several related questions were posed and the resultant discussion flowed across multiple threads toward a synthesised solution that reinforced communal growth.

The educational leaders in the postgraduate programme are relatively basic users of ICT. Kochan & Reed (2005) believe that such participants need to know and appreciate the benefits of using online technology to dialogue with colleagues via asynchronous discussion forums in order to accept using the technology. The Moodle technology is simple to learn, easy to use and allows professional working with colleagues anytime and anywhere, thus easing the pressure of too frequent face-to-face meetings.

Regular face-to-face technical discussion sessions on the use of Moodle were required to loosen the usual formalities which surrounded these leaders and enable better understanding of online usage technicalities and appropriate social and language forms. In short, the school leaders were taught how to use an online discussion forum. These discussions helped alleviate foreseeable hindrances and promoted a motivational sense of team challenge.

In order to appropriately match the learning with the challenge, course workloads were modified to match participant progress as the course developed. Face-to-face seminar work was moved to online discussion work which had the effect of intensifying online professional learning experiences whilst lessening the length of scheduled face-to-face meeting times. The hybrid format allowed for a more effective use of time by the school leaders and also the coordinator. The school leaders came to understand and appreciate an immediate benefit of learning and using the new technology when they first experienced its ability to sustain their face-to-face problem solving through asynchronous anywhere, anytime virtual meetings. This was especially true of the leader from another town who was more isolated by distance than the others.

The participants were also strongly urged to expand their learning potential from individual learning to group learning so that they could also identify and take collaboratively action on practical leadership issues in their workplace. The online component acted as an extension of the on-campus learning environment with the convenience of shared asynchronous response and interaction leading to group learning.

In agreement with Vonderwell et al. (2007), a sense of comfort with the online discussion technology emerged because it allowed introvert and extrovert students to participate equally in the group. This development was supported and encouraged by the coordinator who held group and one-to-one discussions with participants on the need to use their communication and status power harmoniously and pastorally for the good of the group.

The participants learnt to communicate online with trust and respect for each other's point of view. The added online dimension to the group interaction helped the members see more aspects of their own and each other's professional and social personalities and thus enabled more learning about leadership qualities.

As with face-to-face discussion, some participants tend to talk and others tend to respond to them more so than others. This referential power is not as evenly spread as a casual observer might think. This was true even when the moderator attempted to equally spread the communication flow by manipulating the threaded discussions. Some members simply have a greater social presence offline and online. They become a 'communication hub' within the social network and most communication

tends to pass through them. Members who were identified as communication hubs were asked to reflect on their leadership responsibilities and to purposefully take on the responsibility of group harmony and cohesion. This responsibility was a learning experience in leader development that was purposefully built into the course.

SUSTAINING POSITIVE RESPONSES

The main objective of the professional discussion group was to develop sustained educational and social functionality as a collaborative school leader network for professional practice. Hybrid environments can be purpose-designed to support such social interaction by scaffolding the social communal space with trust and belonging, along with ownership of group tasks. Collegial bonding is achieved through setting group tasks rather than the discussion of simple closed topics.

Education is a social process that requires a communal learning space which recognises the need for learners to engage with each other in reflective collaborative dialogue. The coordinator encouraged such learning by shifting the members' leadership practices toward a distributed leadership through peer learning and scaffolding in hybrid discussion forums. In turn, the resultant distributed cognition which emerged from the interactions of all group members in the online social environment also developed healthy distributive leadership qualities (Angeli, 2007).

Intellectual cognition is very much connected to the social context. For group intellectual dialogue to progress and for the group to achieve its goals and complete its tasks, the dialogue must be supported by a sense of group achievement and motivation. Each member needs to feel the convergence of the discussion threads on the group goal. It is the emotional sense of pleasure derived from the act of communication and team success and the bonding of relationships through interaction that stimulates and sustains further networking.

New knowledge was shared face-to-face within the group at the end of each weekly cycle of dialogue. Meanings or styles of argument and distributive leadership practices were clarified through usage rather than explicit definition. These practical knowledge and skill development objects of learning sustained the network group by expanding the common ground amongst the group members.

Throughout the course, regular lectures and discussions were held on the usefulness of workplace hybrid networks with colleagues in districts and clusters for the purpose of collaborative problem solving, professional sharing and development. They also discussed their preferred structure of these workplace networks.

The group decided that their immediate superiors, the district or cluster educational officers, should be the official moderators of workplace networks because they currently conduct their face-to-face meetings and the online network would be an extension of those meetings. However, the course coordinator pointed out that in an ideal school leader network, any member with the appropriate leadership and communication skills, called a communication hub, could take on the role of moderator.

Hubs are members who naturally lead and direct the discussion. Others respond to them because of their leadership display not simply because they may hold a respected face-to-face social position. Most groups have many hubs. Interestingly, a study by Ravid and Rafaeli (2004) demonstrated that, although the moderator was certainly one of the communication hubs, only 20% of hubs were official moderators. The other 80% were simply motivated communicators with something to say. Moderators are hubs who set tasks and monitor the work progress and communication whereas the other hubs tend to direct the communication only.

The group was asked to consider how they could identify and give recognition to communication hubs in their current group and also in their future workplace group.

It was agreed that communication hubs could be recognised by the fact that they provide feedback on the quality and direction of the dialogue and weave the threads together so as to guide convergence of dialogue. It was agreed that the main role of communication hubs is to play deciding roles for various threads of communication and carry out repair processes so as to maintain and sustain a communication network.

In comparison, it was agreed that the moderator's role is to set tasks and to encourage the other 80% of hubs who are members to keep the communication on track. Moderators also carry out a contextualising function by welcoming and introducing group members and setting the rules and atmosphere of the discussion forum so as to prepare the members for an engagement with the appropriate level of intellectual rigor and social harmony.

Whilst these specific in-group strategies help to sustain a positive response to network membership, Silvers et al. (2007) believe that the ultimate global strategy in sustaining the positive responses is to consistently and persistently work toward developing a mature hybrid network community. Salmon (2004) outlines five stages toward maturation:

In stage one, the participants must familiarise themselves with the technology and gain enough confidence to be motivated toward discussion. They must be taught to use the technology. Fortunately, the participants were a small on-campus group. This opportunity for face to face discussion greatly supported the success of their online discussions. The moderator used this opportunity to solve personal and technical problems amongst the group.

In stage two the participants must familiarise themselves with each other's online personality which can have a different characteristics to their usual face to face discussion personality. They need to get to know each other via the sending and receiving of messages. They need to compare and discuss each other's experiences in online and in face-to-face meetings.

In stage three, the participants begin focused information exchange and true collaboration. They must be taught how to construct argument and debate on set topics via an asynchronous conceptual thread so that their communication is just as candid and spontaneous as in their face-to-face meetings. During the face-to-face sessions, the moderator tweaked the human support factor by encouraging a sociable on-line communication style rather than an impersonal professional academic style and setting tasks that required giving help to at least one other member.

In stage four, the participants begin to debate points of view and progressively construct knowledge through common understandings relevant to the initial thread or topic. Further encouragement to engage can come from the facilitator setting group action research tasks and controversial debate, rather than simple individual research work.

In stage five, the participants reflect more on the direction on thread development in the topic under discussion. Rather than simple sharing of points of view, the group needs to move with a purpose toward a clarification of certain concepts and then on to a decision and commitment to best practice. The moderator and communication hubs must carefully follow the communication and interaction flow and decide when and how to input into the discussion group.

HYBRID LEADER DEVELOPMENT LIMITATIONS

Xin and Feenberg (2002) emphasise that the written communication contribution to discourse online lacks all the non-verbal cues of off-line communication. At best, each contribution to discourse develops though a process of presentation by one member and hopefully recognition of understanding and acceptance or counter-argument from another. This staccato effect severely limits the sustainability of the flow of topic along interest and innovative threads.

The asynchronous nature of the communication dynamic further increases the probability of misinterpreting other members' responses. Often in critical argument we make a statement based on a host of immediate non-verbal and verbal responses. Then, in retrospect, we may correct our comments and reframe it. This is called discourse repair and is essential for sustaining the dialogue until completion of the task.

Even though most asynchronous forum learning management systems have a short built-in cooling-off period in which a participant can edit and change their communication, (Moodle cooling-off period is 30 minutes), once a message is sent asynchronously online, after that short period it cannot be revoked and so easily repaired. Already there may be new threads being created that could be undermining the social context as a result of a member's comment. Already members may be losing interest or dropping out due to misinterpreting a particular contribution to discourse.

These seemingly disruptive and destructive characteristics can be overcome by managing the communication to incorporate reflection and meta-learning about the set group task and the technological and social experiences of being in the learning environment. Lund (2004) believes that the preventative strategy is to learn to emphasise social as well as professional performance when attempting to arrive at a solution to a set problem task.

A further failsafe device which is built into most online discussion forum software is the ability to edit one's posting up to thirty minutes directly after posting. All members should clearly understand and remember to use this failsafe device, if on occasion, the preventative strategy of employing well thought out and socially responsible professional communication fails.

Finally, skilled moderators and communication hubs can ease and sustain the communicative process through a series of attempts to verify, repair, and confirm the subject of discussion. If their repair work is successful, then each cycle results in an enlarged shared understanding and group convergence. However when the communication hubs are unsuccessful, the process can result in group deterioration.

Besides the nature of the communication process taking place in online and hybrid networks, another severe limiting factor is the capacity of the members to fully appreciate the potential that such technology has in providing genuine distributed leadership in schools through establishing support networks where school leaders can turn for advice from other school leaders and experts anywhere in the world and not just their local colleague or supervisor.

Perhaps the participants will discover enough reason to instigate their own workplace online networks. However, upon return to the workplace, the daily routine of leading their own schools, their changed professional and personal responsibilities, and having to confront different relationships in different school leader networks, could be too much change at one time and force them to scale down their networking plans, thus severely limiting a potential source of professional and personal support.

The leadership course has only recently been redesigned as a hybrid delivery and only with the current cohort of four school leaders. Although the four school leaders have deemed it a success so far, the coordinator's ulterior course goal of encouraging online workplace school leader networking after the course is yet to be fulfilled. The communication environment is new to most of the school leaders and they need to be consistently and persistently encouraged to use its potential to achieve expanded levels of capacity that were previously unattainable.

HYBRID LEADER DEVELOPMENT CONCLUSIONS

Hybrid collaborative task and support networks featuring asynchronous 'anytime anywhere' communication channels can greatly improve the effectiveness of mentoring newly appointed school

leaders who often need quick simple advice in their early day-to-day decision-making. Accessibility to other school leaders is greatly increased amongst geographically isolated school leaders and those who cannot always attend meetings because of specific idiosyncrasies in their workplace. The capacity is even there to include outside experts in their discussions. These invitees could be other educators in the system, university educators or fellow school leaders and experts from other countries.

Such hybrid networks are also a boon for those school leaders who are involved in work committees or are simply interested in peer professional learning. In many cases the hybrid format promotes improved discussion structure by allow all members to have their say, which does not always happen during face-to-face meetings. However research is needed to understand and improve the online and offline efficiency and effectiveness of communication hubs and moderators.

If moderated effectively, hybrid discussion forums can also help keep systemic vision aligned across school leader networks. However District and Cluster Education Officers still need to act as Ministry-based moderators and monitor school-based improvement action plans.

In order to extend uses of the established discussion network outside the confines of the course and into the members' day to day professional lives, one overarching discussion topic must be to consider ways in which the discussion group members can eventually begin to explore the potential of their course discussion group as a professionally supportive and socially caring environment.

Three 'hard-to-resist' enablers for success are; (a) 'professional content' where members can collaboratively learn from the fruits of their combined professional practice; (b) 'professional and social confidence' where the improvements in professional and social performance can become a motivational trigger for members to sustain their hybrid school leader network; and (c) 'effective professional connection' where a local school leader network has the ability to invite school leaders and expert academics from anywhere on the World Wide Web to collaboratively problem solve and professionally develop.

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The Development of an Adaptive Model of Competence for the Electronics Industry in Thailand

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ABSTRACT

The purpose of this research was to develop an adaptive model of competency development for the electronics industry in Thailand. The study involved a questionnaire, interviews and observations. Eighty nine individuals completed the questionnaire. Interviews were conducted with 10 managers with high experience in competency development from five renowned companies which practiced competency development. Observation was conducted in the five companies. Our adaptive model consists of the following elements: (1) five electronics competency levels which can be compared to Thailand Vocational Qualification, (2) competencies development, and (3) a training model. The training model was composed of a training program, training module, 4H (head, hands, habits, and health) assessment, as well as monitoring and follow-up. This model is particularly well-suited to the electronics industry in Thailand; however, we suggest that it may be useful in other contexts as well. In countries such as Thailand where there are shortages of specialized labour, models such as ours will play an important role in filling gaps and providing the expertise needed for industry.

Keywords: Adaptive Model/Competency Development/Electronics Industries/Sustainability

INTRODUCTION

The issue of competence is of particular importance and relevance in Thailand and especially in the field of electronics. The electronics field in Thailand is important for economic growth, sustainability and Thai society in general because it yields the highest GDP and the highest expandable export figure. The Thai government has adopted a policy to make Thailand the electronics field centre of Asia by improving policies and rights to promote investment from aboard through Foreign Development Investment Project in 2007 so that Thailand could compete with other countries (Office of Industrial Economics 2007). Since knowledge and technology in the sciences have changed dramatically, personnel in the electronics field must improve their competence and organization. In fact, the Board of Investment (BOI) realized this importance and enacted a policy to promote

competence development entitled “Skills, Technology and Innovation (STI) incentive package” whose objectives were to let electronics companies do research and plan or improve their human resources.

In this era of globalization, the development of competence is crucial to human resource development and to quality assurance, not only in Thailand, but around the world. According to Linton and Walsh (2000), the effective management, acquisition and development of technological competence is a subject of widespread concern. In fact, the industrial organization of developing countries such as Europe and Australia will increasingly concentrate on the competency of quality and standards of their employees (Australian National Training Authority 1996 & Stewart and Winter 1995). The quality and standards of competency can be applied as a basis for job descriptions, assessment and reward, a benchmark to development, to identify training needs and to develop training programs (Office of standard for vocational and professional 2005).

The word “competence” comes from Latin which is “competere” which means aptitude, expertise, experiences, and other characteristics of competence in performing an activity or in participating in a specific matter (Giraldo & Acuńa 2005). In addition, competence has acquired new meaning in psychological and educational settings and relates to three aspects: 1) achievement, 2) proficiency, and 3) knowledge of a particular domain. However, none of the three concepts is a competence; the competence emerges as a unity when the concepts are joined in a particular action (Tobón 2004).
According to ISO 9000:2000, competence can be defined as a demonstrated ability to apply knowledge and skills (Blank 1982) and, as Lloyd and Cook (1993) argue, competence is the ability to perform activities to the level expected within employment. Janwongpaisan (2006) also defined it as “Skills, knowledge and attribute of a person essential to their work and to their work achievement.”

White and McClelland (Janwongpaisan 2006) were the first to propose the idea of competence in journals related to human resource development, explaining the relationship of excellent performer and the level of knowledge, skills, and abilities to the world.

In spite of the importance of competency development particularly for Thailand and for the electronics industry, we do not have any models for competency development in this country.

OBJECTIVES OF THE STUDY

The objective of the study reported in this paper was to create an innovative and adaptive model of competency development for electronics industries in Thailand. We have chosen electronics as a case; however, competency is important in all industries and especially in developing countries such as Thailand.

OUTCOMES OF THE STUDY

The results of this study will be of use to trainers who can apply the results of this study to the development of learning innovation appropriate for organizations concerned with competence development. They can apply the model for quality competence development of learning innovation in their organizations; for example, using a system for competence development and promotion. The data in the system would provide trainers with information to give suitable training to fill staff’s competence gap which is an obstacle in their career path. Organizations and/or relevant institutes can apply the results of this study to the establishment of policy in order to develop, train, and/or evaluate staff’s competence. These types of policies may increase staff’s attitude towards career and collaboration in organizations.

THEORETICAL FRAMEWORK

Competency

Competence and competency (Rowe 1995) and (McGettrick, May & Ward 2000) are likely to be used interchangeably. However, in terms of application, it seems that competence is mainly about skill and standard of performance. Competence focuses on "what people can do." In contrast, competency focuses on "how they do it." Therefore, the relationship or the interface between these two words when the word 'competent' is used to describe a behaviour can be seen in Figure 1 (Rowe 1995).

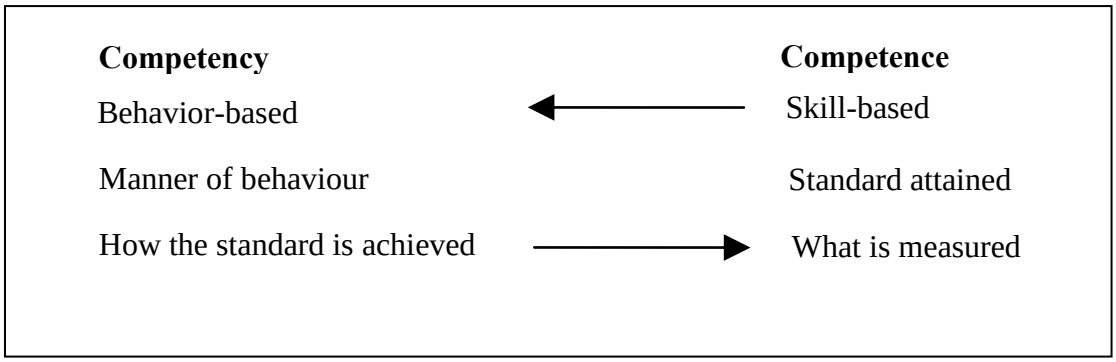

Figure 1: The interface between competency and competence

According to Figure 1, in order to have competency, entrepreneurs have to do what we may call 'trial and error' during their apprenticeship. In other words, they learn by themselves until they can attain modern standards. Competency is normally skill-based. Entrepreneurs apprentice to gain skills which are measured at a later time. Following the measurement, such skills are defined as standard. The skills are then considered permanent or part of the competency. The standard is achieved so that we know what is to be measured.

Figure 2 (Young 2002) links competence and competency to performance. Competence is what a person is required to do. These are job activities or functions and tasks. Competency consists of what a person is like (personal characteristics) and what they can do (behaviour). Both competence and competency are required to achieve what a person must accomplish, that is to say, job performance.

This means that behaviour and skill are not enough to have effective performance. A person needs to possess personal characteristics which are composed of motive, trait, image/role and knowledge.

Different personal characteristics, therefore, affect the behaviour and skills of such person through their performance. In order to achieve high performance, we need to measure two competencies which are core competencies and soft or 'technical' competencies. The concise description of competence, competency and performance is shown in Figure 2.

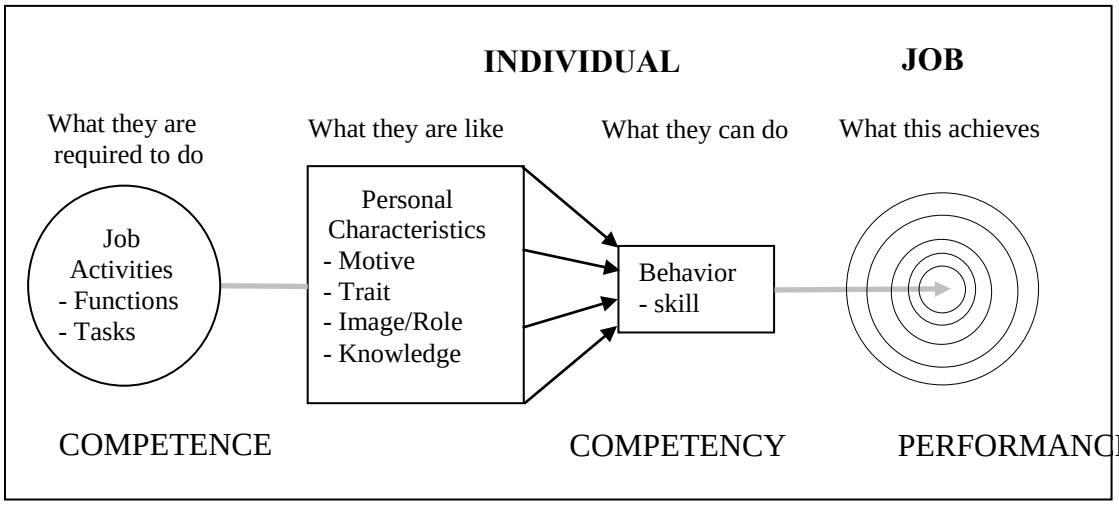

Figure 2: Linking competence and competency to performance

Plonka, Hillman, Clarke, and Taraman (1994) revealed that there are four core competencies as follows: (1) know oneself and work with others, (2) design, build, and run high value-added manufacturing systems, (3) solve unstructured problems, and (4) lead change. Ng, Chan and Wong (2006) classified main competency into three levels based on and Engineering Competency Development (ECD's framework, 2006): basic, intermediate and advanced. McGettrick, May and Ward (2000) also classified competencies into three levels: supervised practitioner, practitioner, and expert.

Moreover, competencies must: (1) be attractive, challenging, and rewarding to employees (2) guide and assist managers to add value and to help them assemble teams to work on projects, and (3) lead to the development of better employees. The Instituto Nacional de Empleo de España (INEM) (as cited by Serpell & Ferrada 2007) explains that "professional competencies define the effective use of skills that allow work to be performed with regard to the levels required by the job." Serpell and Ferrada (2007) define 'core competencies' as (1) basic competencies as entry attributes, this is, the knowledge, abilities and attitude of a person upon joining an organization; (2) organizational competencies as those that are directly related to the value, policies, and culture of the organization; and (3) labour function competencies as a mixture of knowledge, abilities and psycho-social behaviours, both technical and generic to the function in question. The summary of core competencies as defined in all four studies is shown in Table 1.

Table 1: A summary of core competencies

Plonka, Hillman, Clarke and Taraman (1994)	**Ng, Chan and Wong (2006)**	**McGettrick, May and Ward (2000)**	**Serpell and Ferrada (2007)**
1) know self & work with others	Basic	1) attractive, challenging and rewarding to employees	1) basic competencies as entry attributes, this is, the knowledge, abilities and attitude of a person upon joining an organization

2) design, build and run high value-added manufacturing systems	Intermediate	2) guiding and assisting managers to add value and to help them assemble terms to work on projects	2) organizational competencies as those that are directly related to the value, policies and culture of the organization
3) solve unstructured problems 4) lead change	Advanced	3) leading to the development of better employees to address this area	3) labour function competencies as a mixture of knowledge, abilities and psycho-social behaviours, both technical and generic to the function in question

Besides core competencies, there are also technical competencies which we may call as soft competencies. Technical competencies (Hlaoittinun, Bonjour & Dulmet 2007) are attributes which specify the characteristics of tasks and team members. Moreover, competencies of a person will increase during their work on the assignments and will decrease with time. Therefore, it is suggested that assigning tasks is a good indicator of increasing competency development of such person.

Boucher, Bonjour, and Grabot (2007) posit that competencies can be seen in three different forms which are static, functional and evolutionary. Hlaoittinun, Bonjour and Dulmet (2007) explain that the mechanisms of competency mobilization in the context of work is to make the best use of available competencies. They also discuss how to measure a compatibility indicator. They found that the difference between positive gap and negative gap can be used to identify the level of competency. If there are more results in the positive gap, this shows a level of over competency. In contrast, more occurrences in the negative gap reveal a level of under competency.

Woodruffe (as cited by Serpell & Ferrada 2007) observed that competencies will become common language and there will be differences in the limitation of competency. That is to say, skill is mainly about 'a role or job-related concept' whereas competency is mainly about 'a person-related concept' which can describe behaviours necessary to accomplish tasks or functions of the job. In terms of proficiency, Mertens (as cited by Serpell & Ferrada 2007) found that competency-based management has been used in developed countries as well as many developing countries.

Linton and Walsh (1999) noted that learning techniques to achieve competencies is important. Technology plays an important role in shaping the relationship between related subjects in order to achieve competencies. This helps the acquisition of technical competencies.

Antonacopoulou and Fitzgerald (1996) found that competency management is like a framework to be referenced. There can be inputs for organizations and outputs in the form of performances. The performance is evaluated based on the criteria. The competency management can also be used in recruitment and selection, training and development, changing the personnel, changing the structure, giving rewards and benefits. Alles (2000) observed that a competency framework is considered as the main resource to add value to the personnel. Serpell and Ferrada (2007) observed that a competency approach can be used as a framework to develop systematic training which is beneficial to the personnel.

Andreou and Bontis (2007) and Adonis and Drira (2007) posit that human capital, structural capital, and customer capital are all factors which can be used in strategies to specify the limitation of competence of such organization so that the same objectives of the strategy are attained.

RESEARCH METHODOLOGY

Procedures

In the first phase, we sent out one questionnaire to the manager of each of 319 small, medium and large electronics companies in Bangkok and suburban areas of Thailand in April, 2006. We asked in the letter that the questionnaire be completed by those dealing with competency development in the organization. We received 89 responses. From these 89, we selected five companies with which to conduct the semi-structured interviews as well as observations. We conducted interviews with two individuals in each company. One was a senior manager and one a factory manager.

Questionnaire

We began with the choice of a questionnaire. The questionnaire was taken from the European Centre for Development of Vocational Training (Cedefop 2006). We translated the questionnaire into the Thai language. There were 105 items. We validated the content of the questionnaire using five Thai experts with English as a second language. The first part of the questionnaire included demographic information (i.e. position in the company, gender, etc.). Part II asked respondents to provide information about the company itself (i.e. its products and size, etc.). Part III included five sections as follows: (1) competence management, (2) the use of competence (level), (3) personnel categories involved, (4) policy levels of competence, and (5) competence development needs.

Interview protocol

We adapted a semi-structured interview protocol from the European Centre for the Development of Vocational Training (Cedefop 2006), which includes four main items as follows: (1) Companies' policy for competence development in organizations, (2) Companies' qualification requirements, (3) Training description and model, and (4) Assessment system. The interviews typically lasted two to three hours per person. The purpose of the interviews was to gather more in-depth information.

Observation

In addition to the questionnaires and interviews, we conducted observations lasting three to four hours in five of the companies. These companies had over 200 employees. The observations were also semi-structured and used the same protocol as the interviews. The purpose of the observations was to gain a more holistic insight into competency management in the company.

Analysis of Data

The questionnaire data were analysed using frequency, percentage, mean and standard deviation. The interviews and observation data were analysed using content analysis. We aggregated the data from these sources and grouped them into the four categories. We reduced the data in cases where there were similarities. We used keyword analysis (Miles & Huberman 1994). We then constructed a matrix table to compare across companies.

RESULTS OF THE STUDY

Based on the analysis of our data, we first identified eight dimensions of competency development in electronics companies as follows: Policy; training models; learning activities; target group of trainees; scope of the training course contents; training steps; evaluation and follow-up; application of the

evaluation. Next, we developed our adaptive model of competency development from our data and according to the concept of workplace learning model by Smith, Robertson and Wakefield (2002) and by Sadler-Smith, Down and Lean (2000) who argue that "the enhancement of working in organization …begins at the stage of needs assessment in developing the organization and the needs of each person." Choosing the training method and media affect this model and also depends on the attributes, styles and preferences of trainees. The limitations of the organization might be resources, time and facilities. Our model is comprised of five electronics competency levels as follows:

- Level 1: operation/semi-skilled
- Level 2: semi-skilled/specialized skilled craftsman
- Level 3: craftsman/supervisor
- Level 4: technical management/management/professional
- Level 5: careers appraised by professional society/administrator level/specialist/senior.

These five levels were benchmarked and compared against the National Vocational Qualification or Thailand Vocational Qualification (NVQ/TVQ) framework (Bureau of Vocational Education Standard and Qualification 2005). The NVQ/TVQ lists seven standards for vocational education. Our levels corresponded for level 5 to TVQ standards 1-5. Levels 6 and 7 correspond to Ph.D and graduate levels. The NVQ/TVQ includes three types of competencies. The first of these, the core competencies, include knowledge, skills and working habits or behaviours. The second, professional competencies, relates to the management and administration competencies. The functionality concerns the roles and duties.

The new model includes a training system suitable for electronic engineers or technicians. The training system includes three parts: a training model, a training module, and 4H assessment. The training system should be dynamic, so the Evaluate Monitor Follow-up approach was employed to evaluate, monitor, and follow-up the training process. The training models might include flexible delivery, blended, team and collaborative learning. Assessment includes a ranking to determine if the individual is in level 1,2,3,4 or 5. Next, it must be determined if the individual meets the standards. If they do or do not meet the standards, they can be demoted or upgraded a level or remain at the same level. The 4H means that the assessment must relate to the heart (motivations and personal traits), head (knowledge and cognitive skills), hand (practical skills) and health (hygiene and safety).

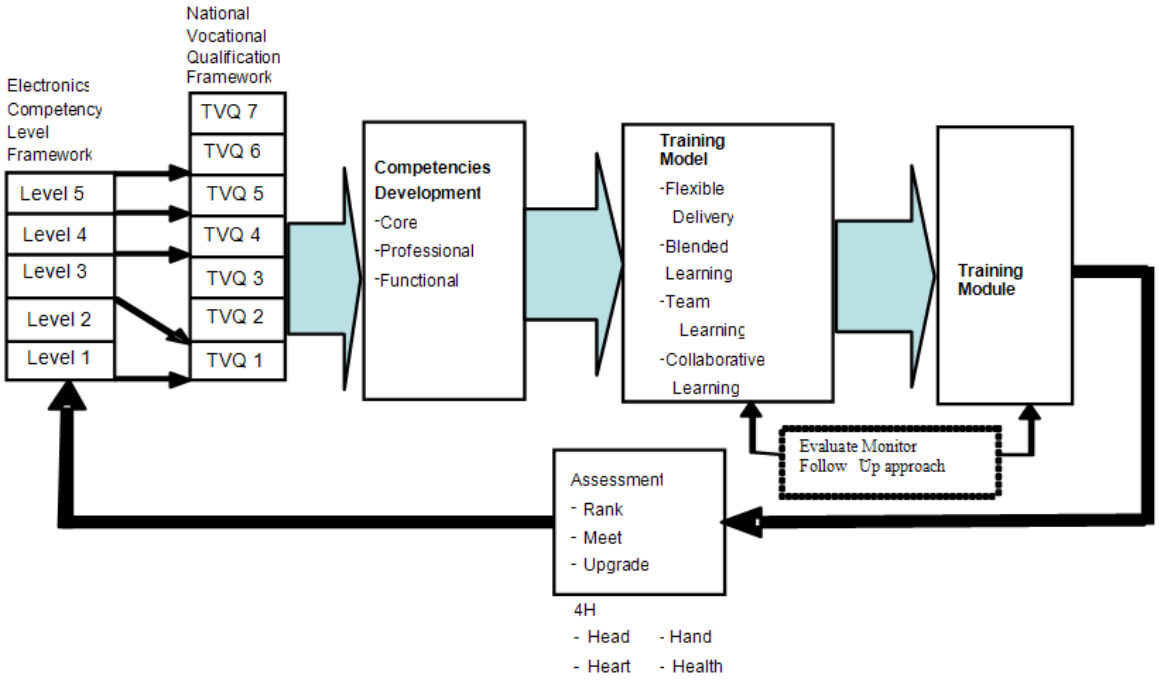

Figure 3: *Adaptive model of competency development for the electronics industry in Thailand*

DISCUSSION AND CONCLUSIONS

The purpose of this research was to develop an adaptive model of competency development for the electronics industry in Thailand. The study involved a questionnaire, interviews and observations. Eighty-nine individuals completed the questionnaire. Interviews were conducted with 10 managers with high experience in competency development from five renowned companies which practiced competency development. Observation was conducted in the five companies. Our adaptive model consists of the following elements: (1) five electronics' competency levels which can be compared to Thailand Vocational Qualification, (2) competencies development, and (3) a training model. The training model consisted of training program, training module, 4H (head, hands, habits, and health) assessment, as well as monitoring and follow-up.

Presently, in Thailand, an individual at level 2 cannot upgrade to a higher level. The use of this model would provide an approach for allowing individuals to move across levels. For example, a craftsman could move to a position of craftsman supervisor. This model is particularly well-suited to the electronics industry in Thailand, however; we suggest that it may be useful in other contexts as well. In countries such as Thailand where there are shortages of specialized labour, models such as ours will play an important role in filling gaps and providing the expertise needed for industry.

In order for the training to be successful, it must allow flexible delivery. Flexible delivery is well-suited to improving personnel competence in organizations. Smith (2003) outlines the advantages of resource-based flexible training as follows. It "(1) provides opportunities for learning on an individual basis, (2) enables learning that is sustainable within shift and production schedules, and (3) minimizes the need for expensive one-to-one instruction and demonstration from a more expert trainer." Flexible delivery means an advantage in preparing and assessment in the way that learners need not appear at a fixed location or time. Materials used for learning could be varied and are supposed to accommodate the issues of when, where, how, and what learners learn. Payne, Ball and Snow (2000) explain that flexible delivery is different from interaction between instructors and learners in that flexible delivery have options in terms of time and place. However, learners in flexible delivery systems need to be more responsible for their own learning.

This study was limited to participation by a small group of managers. Results may have been different if we had worked with a larger group. Also our response rate was low in comparison to the number of questionnaires sent out. Those who responded may have different or specialized views about competency development. Our study was limited to the electronics industry and only focused on the Thai context. Others may wish to apply the model in their context to test its relevance.

Issues for further in-depth study might include a comparison of the impact from various strategies such as flexible delivery strategy, training outcome strategy and/or the learning content strategy in the electronics industry in order to create future effective competency models. Trainers can apply the results of this study to the development of learning innovation appropriate for organizations concerned with competence development. They can apply the model for quality competence development of learning innovation in their organizations; for example, in systems for competence development and promotion. Organizations and/or relevant institutes can apply the results of this study to the establishment of policy in order to develop, train, and/or evaluate staff's competence.

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ABSTRACT

In Australia, all higher education Information and Communications Technology (ICT) programs seek accreditation at the professional level with the Australian Computer Society (ACS). It acts as the basis for national and international benchmarking of ICT professional education. Additionally, meeting the requirements of an independent professional body is vital for onshore and offshore course marketing purposes, hence contributing towards the University's performance portfolio.

The overriding task of the ACS accreditation is to examine all aspects in the provision of a quality ICT education program designed to produce competent graduates. To this end, the ACS seeks evidence that comprehensively covers the three main aspects of accreditation assessment: the structure and content of curricula; the resources of the teaching and learning environments; and the quality assurance processes in place at the applying University.

This paper describes the recent ACS accreditation of Victoria University computing courses: the accreditation process, the preparation for the accreditation, the visit of the accreditation panel and their feedback. The paper reports on the local response and the process of addressing the panel recommendations which posed a number of local challenges. An insight into issues of importance in the execution of the recommendations is discussed as the ACS accreditation informs the framework for future course reviews.

INTRODUCTION

Acquiring a recognized professional body accreditation is pivotal for all quality, technically-based, academic programs. In particular, such endorsement is vital as a quality assurance measure for courses which have a major component of Information and Communications Technology (ICT) content. It acts as the basis of national and international benchmarking of ICT professional education and it shapes the curricula (Harman & Meek, 2000, p. 3; Collings et al., 2005). Internationally, these professional organizations include the Association for Computing Machinery (ACM), the Accreditation Board for Engineering and Technology (ABET), the Institute for Certification of Computing Professionals (ICCP) and the Institute of Electrical and Electronics Engineers (IEEE) (ACM, 2007; ABET, 2007; ICCP, 2007; IEEE, 2007).

In Australia, higher education is an important export industry, with large cohorts of offshore and onshore international students (Harman & Meek, 2000, p. 33). The endorsement of a professional accreditation ensures international credibility and it enhances the marketability of academic programs (ACS, 2003; Jones & Price, 2002; Tan & Venables, 2007; Ramakrishnan, 2007). The Australian Computer Society (ACS) is the professional body responsible for the assessment of all higher education ICT courses accreditation ensuring that their programs are of an 'industrial strength'.

Founded in 1966, the ACS provides the public voice of Australian ICT businesses and professionals. The association attracts membership from all sectors of business, industry, government and academia. Its objectives are 'to further the study, science and application of Information Technology; promote, develop and monitor competence in the practice of ICT by people and organisations; maintain and

promote a code of ethics for members of the Society; define and promote standards of knowledge of ICT for members, promote the formulation of effective policies on ICT and related matters; extend the knowledge and understanding of ICT in the community; promote the benefits of membership of the Society and promote the benefits of employing members of the Society' (ACS, 2007).

Through the key service of program accreditation for higher education courses, the ACS assesses the suitability of potential graduates as ICT professionals through the dissection of course content and structure, based on the criteria of outcome-based learning, along with examination of staff and educational resources. It also assesses the quality assurance processes of the applying institutions. The set of accreditation criteria is similar to that used by the Computing Accreditation Commission of the ABET for the accreditation of undergraduate computing programs in the United States (Crouch & Schwartzman, 2003).

ACS ACCREDITATION PROCESS

The standard lifespan of an ACS accreditation is five years and it may be granted by the society for one of two different grades of accreditation: the professional level for courses with a major IT focus, and the associate level for other IT related programs. A submission for ACS accreditation is initiated at the invitation of the applying university with the entire process expected to take at least six months. The key steps include completion of a suite of ACS documentation templates by the University, the assembling of an assessment panel by the ACS, followed by the panel's site visit and the eventual final report of the ACS recommendations and assessment.

The overriding task of the ACS accreditation is to examine all aspects in the provision of a quality ICT education program designed to produce competent graduates. To this end, evidence based documentation is required that comprehensively covers the three main aspects of accreditation assessment: the structure and content of curricula; the resources of the teaching and learning environments; and the quality assurance processes in place at the University. A site visit is also scheduled to support the validity of the furnished documentation.

The course structure and content for any program is examined against the Society's defined core body of knowledge (CBOK). It is important to note that the ACS view is 'The CBOK does not in itself constitute a curriculum it is more a scoping exercise of the disciplines involved in information and communications technology that should be considered in the establishment of a curriculum.' (ACS, 2003, p. 9). Broadly speaking the CBOK is based upon recommendations made by its American counterpart, the ACM. The CBOK comprises both generic and ICT specific skill sets, as detailed in Table 1.

Group 1- Generic	Group 2 – ICT Specific
Interpersonal Communications	Data Structures and Algorithms
	Program Design and Implementation
	Software Engineering and Methodologies
Ethics/Social Implications/Professional Practice	Information Security
	Conceptual Modelling
	Systems Analysis and Design
	Database Management
Project Management and Quality Principles	Computer Organization and Architecture
	Systems Software
	Data Communications and Networks
	Discrete Mathematics

Table 1: ACS Core Body of Knowledge (CBOK)

Examination of the teaching and learning environment focuses on the human and physical resources supporting the delivery of an ICT program. Details are needed for all academic and technical support

staff and they include staff qualifications, their experience and levels of expertise. Physical facilities such as laboratories, instructional resources and the provision of library resources also come under inspection.

Checks of quality assurance processes include examination of various University policies regarding student entry into the program, the teaching and learning strategies, student assessment and mandated core graduate attributes against the evidence of successful student outcomes and graduate profiles. Inspection is made of the mechanism of staff selection, staff performance development plan and the code of conduct. Of particular interest to the Society are any advisory mechanisms used to provide professional and industry input to the program design and its delivery.

THE PREPARATION

At Victoria University in Melbourne, Australia, the last ACS accreditation was undertaken in 2001 whereby 5 separate undergraduate and 5 postgraduate programs were evaluated and received their respective ACS level. Since that time, our offerings have been expanded to 15 different programs, 8 undergraduate and 7 postgraduate as listed in Table 2. All new and existing courses came due for accreditation in late 2006 and so an invitation was sent to the ACS initiating accreditation.

Title of Course	Level of Accreditation Sought
Undergraduate Programs	
Bachelor of Science in Computer Science	Professional
Bachelor of Science in Computer and Mathematical Sciences	Professional
Bachelor of Science in Internet Technologies and Applications	Professional
Bachelor of Science in Information Technology	Professional
Bachelor of Science in Computational Financial Mathematics	Associate
Bachelor of Science in Computer Science and Aviation	Associate
Honours Programs	
Bachelor of Science (Honours) in Computer Science	Professional
Bachelor of Science (Honours) in Computer and Mathematical Sciences	Associate
Postgraduate Programs	
Graduate Diploma in Multimedia Information Networking	Professional
Graduate Diploma in Software Engineering	Professional
Graduate Diploma in Computer Science	Professional
Graduate Diploma in Computer and Mathematical Sciences	Associate
Master of Science in Software Engineering	Professional
Master of Science in Computer Science	Professional
Master of Science in Computer and Mathematical Sciences	Associate

Table 2: A list of programs submitted for accreditation in 2006

Locally, the process commenced with a meeting of the key stakeholders inclusive of the head of school, course co-ordinator, year level co-ordinators, off shore program managers and the school advisory committee members to discuss the application requirements as outlined in the Guidelines (ACS, 2003). Initially, the head of school delegated the collection of various documents to describe the program under the broad headings of: descriptions of the course structure including contents of individual units of study offerings; staffing details, qualifications and experience; the provision of

support infrastructure such as technical facilities and library resources; and the quality assurance mechanisms in place.

Over the following months, several meetings were convened to examine the ongoing data collection and its veracity, to identify shortfalls in the collected information, to assign new collection tasks and to organise overall collation. The completion of the supporting documentation was an arduous task that relied upon a concerted team effort amongst academic staff and a process which has been widely reported to contribute undue anxiety (Crouch & Schwartzman, 2003; Yue, 2007). Collation involved the use of mandatory ACS templates to organise and format the collected information into two volumes totalling approximately 400 pages. Finally, the completed volumes were submitted to the ACS for examination prior to a mutually scheduled accreditation visit.

Prior to the accreditation visit, the ACS oversaw the appointment of panel members with the provision that the participating university may nominate one panel member. In our instance, five panel members were chosen, being the manager of the ACS, three interstate senior computing academics and one industry representative as nominated by our university. The applying university was responsible for all travel arrangements and accommodation for visiting panel members.

The ACS sent an itinerary of proposed meetings of the panel, alone, and together with members of the deanery and chancellery, senior school staff, teaching staff, students and graduates, as well as scheduled inspections of computing facilities, teaching spaces and library resources. Additionally, the University was expected to ensure a full coverage and representation of the various key groups at these meetings. The three main foci of assessment were each given approximately the same amount of time in the scheduled meetings for the day.

THE VISIT

In preparation, the panel convened on the evening before the site visit for a briefing session of several hours. A preview of the completed documentation was made which looked for evidence of coherency in three components of assessment against the documentation provided. They identified areas that were evidently satisfactory which did not require further action as well as issues of concern that would need additional information during the site visit.

The onsite visit went ahead as planned with each meeting lasting approximately one hour. The panel queried each attending group regarding their perspective of the course structure, program delivery and the local educational culture. Of interest was the alignment of units of study and course objectives and associated outcomes and coverage of the CBOK. As well, they asked about the provision of resources and the suitability of the support mechanisms within University along with the impact of University policies within the program.

The panel sampled an array of differing examination scripts across all year levels in an effort to assess the depth and the breadth of program offerings. A careful scrutiny of the capstone tasks of the final year industry projects were made, with staff and students being interviewed extensively about their quality and impact. A particular focus of the panel was on the system processes ensuring quality at all levels throughout the University. It encompassed internal course development and approvals, particularly those involving external advisory boards.

The Feedback

Feedback from the ACS panel came in two stages. An initial preliminary oral report was made to the Dean and senior staff of the School at the completion of the site visit. Some months later a draft comprehensive report was sent to the School. It encompassed all aspects of the assessment together with the final outcomes for each of the individual course accreditation applications. Then the School had the opportunity to comment or correct on matters of fact. The draft was returned to the convenor

for the final report preparation. The formal report was then approved by the ACS Board before it was forwarded to the University's Vice Chancellor.

Positive feedback was obtained from the ACS accreditation panel. This mentioned the quality of the final year capstone projects and their impact on student learning outcomes; in particular, ACS complimented the strengthening of alliances that had been made with industry partners. The ACS documented that students and graduates were very supportive of the capstone project subject and of the course as a whole. Particularly, students and graduates recognized the enthusiasm of the academic staff, their availability in assisting them as well as the quality of computing facilities and resources. The panel also commended the School's plans to embed contextual learning by aiming to provide 25% learning in the workplace within the program content. However, they cautioned the School that these plans should not weaken the intellectual rigor appropriate to a computing course. The ACS advised that the assessment practices would need to be aligned with the learning and teaching activities and the overall course objectives. The Panel were generally satisfied with the resources available on staffing and infrastructure in the delivery of the programs.

PANEL'S RECOMMENDATIONS

Further to the overall feedback, several specific recommendations from the Panel were made and are detailed below under the following headings: - Course Matters, Student Matters, Quality Assurance and Advisory Mechanisms.

Course Matters

The Panel deemed that while our undergraduate courses covered the breadth of the CBOK, more intellectual thoroughness was still needed, particularly in the second and third year of the undergraduate courses that were seeking accreditation at the professional level. This, however, was not a problem for the courses seeking accreditation at Associate level. Hence, the Panel recommended a benchmarking study to be undertaken with other universities ensuring that standards of our courses remain equivalent to those of other Australian universities.

Student Matters

In the meeting with students and graduates, the Panel observed that both students and graduates were articulate and supportive of the courses. However, they noted an absence of a total 'student experience' in that there was very little opportunity for students to meet besides in the classrooms. The Panel identified the lack of a student common room as a problem. There were limited opportunities for students to meet and interact which was further exacerbated by the fact that most students support themselves through work, and therefore have little spare time for extracurricular activities. The Panel recommended that the School take steps to provide the necessary facilities for fostering social networking of students and to also provide access to alumni for the current student cohort.

Quality Assurance

The Panel lauded the current framework of quality assurance policies that had been established in the University. In particular, the generic skills described in the Core Graduate Attributes (CGA) Policy at the University overlapped significantly with the desired ACS CBOK. The current CGA policy of Victoria University mandates that each exiting student can

- effectively problem solve in a range of settings, including professional practice;
- locate, evaluate, manage and use information effectively;
- communicates effectively as a professional and as a citizen;

- work both autonomously and collaboratively as a professional;
- work effectively in settings of social and cultural diversity (Miliszweska & Tan, 2004).

Paramount to the implementation of the local CGA policy is the understanding that assessment tasks should relate and develop these generic attributes. While commending the CGA policy, the ACS Panel noted that the subject descriptions should relate to the CGAs and that the students should be formally informed of the desirable graduate outcomes each time they undertake an assessment task.

Unlike the CGA policy, the ACS noted that not all policies had reached full development. For example, there was a formal process of student evaluation of teaching and units of study; the shortcoming being that there seemed to be no proper process to measure how these individual evaluations meet the course objectives as a whole. A similar lack of measurable performance indicators has been reported as problematic for like programs by Crouch and Schwartzman (2003). In our case, the panel strongly recommended that a strategic course management program be further developed and implemented. It should start with course objectives and technical knowledge requirements and examine how these will be achieved through the course curriculum. Identification of the measuring instruments for the evaluation of how the course objectives are met is part of this process.

Advisory Mechanisms

The Panel recognized the existence of an internal School Advisory Board (SAB) whose task was to provide internal academic advice and direction for both local and offshore courses. Additionally, the work of the SAB should be informed by input from an external Course Advisory Board which had only been recently formed. The Panel recommended that a meeting of the Course Advisory Board be scheduled as soon as possible to establish the quality and currency of the courses through professional and formal links with industry.

THE RESPONSE

Although the accreditation is not in itself a full review or audit of courses, it did help identify key areas that needed immediate attention and some forward planning. Responses to the ACS recommendations, needed to take into account the needs of different stakeholders, including the University, staff of the School, industry partners and students. Some issues for consideration in formulating our responses included:

- How does compliance with the ACS recommendations impact upon existing University policies and expectations? Are there any conflicts?
- When is a timely response to the ACS recommendations given they are not synchronized with standard University processes?
- What is the best way to benchmark our courses to ensure depth, breadth and the currency of programs?
- How would our responses maintain or enhance the educational outcomes of the course?
- What resources and infrastructures are available to develop appropriate responses?
- What will the overall impacts be upon the student cohort at all year levels? And how will our solutions enhance the ‘student experience’?
- How do we strengthen our alliances with industry partners?
- How do we strengthen our ties with alumni?
- How is it possible to measure course objectives and their outcomes?
- Is it possible to make use of existing mechanisms to measure course objectives and their outcomes?

With these questions in mind, the responses to the ACS recommendations are aligned under the same headings given in the panel's recommendations.

Course Matters

Since the University routinely conducts academic review of all course programs on a four year cycle, the feedback from the Panel would be useful in informing our impending course review. With the ACS recommendations in mind, we have been benchmarking the program with similar programs at other Australian institutions. In particular, we have taken on board the ACS suggestion that our programs be checked for depth of coverage of their CBOK. A detailed cross examination of all related units has been undertaken to identify shortfalls and possible topics for extension that need to be included. This is quite an onerous task where great attention to detail is needed to ensure seamless delivery of related units of study. Yue (2007) advocates a similar course-based assessment model as the course committee is responsible for all facets of learning assessment including evaluation of assessment tools.

Conflict with the University policy of 25% of learning in the workplace for any program structure had been flagged by the ACS as possibly being problematic. Their concerns regarding the depth of content within such a framework caution us to be extremely careful in how such a policy is implemented in our IT programs. As yet, the implementation of the policy can only take place during the impending course review.

Of course, any benchmarking study with other universities will require extensive resources and support. For example, the recent construction within the School of an Access Grid Room (AGR) has made it is possible to interact remotely, yet interactively, with other institutions against whom we wish to benchmark (ICE-EM, 2007). The facility has been funded by the Australian Government and it can be used for discussion, seminars, lectures and collaborative research. The AGR allows us the opportunity to offer our students a range of specialty units of study at other institutions, live and online, and vice versa. In particular, it can be used to share the teaching of the Honours programs students. It is expected to inspire students by demonstrating the diverse range of opportunities available to them.

Student Matters

Prior to the visit by the ACS Panel, important steps to improve the 'student experience' were already in the pipeline. Over time, we had identified the first semester experience as crucial to students' overall success in the computing course. A number of transition related problems seem to impact negatively on commencing students; this is especially true for female students as they are more likely to seek a social framework amongst their contemporaries (Miliszewska et al., 2006). The need for a peer mentoring program in the first semester programming unit prompted some faculty members to apply for a University Teaching and Learning Grant to support such a scheme.

Since the ACS Panel visit, the peer mentoring program has come to fruition. In the following semester, in addition to timetabled lectures, tutorials and laboratory classes, mentoring classes were offered in a designated laboratory, three days a week, at the same hour every day. As it was important that commencing students could identify with their mentors, the student mentors were carefully chosen from amongst the successful second year and third year students who had good interpersonal skills and were from differing backgrounds. The tasks for mentors were to provide 'friendly' professional feedback and support to new programming students.

At the time of the Panel visit, there already existed a dedicated room for final year computing students. This room was used as a special laboratory for students completing their capstone projects and, as such, it encouraged social interaction amongst this group. Staff had already identified the need for a

similar facility for both the first and second year students and rooms had already drafted for these in an upcoming facilities upgrade.

It has become a practice to invite recent past alumni to speak about their working experiences with students undertaking final year industry projects at several occasions throughout the academic year. At the end of the year, funded by a government grant, recent graduates conduct all useability testing of third year projects. This is a networking opportunity where alumni offer their professional critiques of students' work and students can gain valuable insights into current industry practice.

It is hoped that the above measures will foster a community spirit amongst the students by allowing them the resources, space and opportunities for social interaction with their classmates and recent alumni.

Quality Assurance

From the University, through to the Faculty of Health, Engineering and Science and down to the School of Computer Science and Mathematics, there exists a quality assurance framework that ensures annual, biennial and quadrennial reviews of academic programs. The ACS recommendations have focused our attention on finding a suitable measure for individual course outcomes at the School level. To this end, discussions have been undertaken to see if existing voluntary measures such as the current student evaluation of individual subjects and student evaluation of teaching can be made mandatory for all units of study. This way, analysis across units, programs and years can be made to identify trends and any shortcomings.

Advisory Mechanisms

Subsequent to the ACS Panel visit, the external Course Advisory Board has met to discuss the current position of our programs and possible future directions. Members of the Board included industry representatives, professorial academic staff from other institutions and our senior academics. All participated in lively exchange of information and advice and saw the meeting as being the first of series of ongoing communications amongst the group. The key role of the Board will be to advise upon the challenges faced by the School and guide future directions undertaken by the School.

CONCLUSIONS

ICT course content is under continual review and change due to the evolution of the discipline, the introduction of new technologies, the financial constraints resulting from see-sawing student numbers and the demands of industry accreditation boards (Gruba et al., 2004, Tan & Venables, 2007). Meanwhile, students expect their ICT programs to be professionally accredited with the ACS, so that upon graduation they are automatically eligible for membership with the body thereby enhancing their employability.

An ACS accreditation is a symbiosis between the organisation and the applying University; graduate membership adds new blood to the ACS and the acquisition of accreditation for any university enhances the overall reputation of their ICT programs. As such, the process is a scoping exercise, conducted in a cooperative manner; it can be considered as essentially a quality assurance framework for ICT courses and a major driver for program improvement.

From the University perspective, a commitment to providing quality IT education necessitates the acquisition of an ACS endorsement. However, satisfying the needs and expectation for all stakeholders is challenging, particularly when the appropriate responses are likely to impact upon course design and may need substantial funding. This has been the case at Victoria University where responses to ACS recommendations have refined the process for setting course objectives and

assessment methods; necessitated considerable academic review; called for further attention to policy implementations and financial support sought from the University and from government grants.

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The Introduction of a 'Learning in the Workplace' Component for an Undergraduate IT Program and its Impact on Professional Accreditation

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ABSTRACT

A new learning in the workplace and community policy (LiWC) at Victoria University has been introduced to ensure that graduates are job and career ready. The policy mandates that all programs incorporate at least a 25% workplace contextual learning component by 2010. For the IT undergraduate program, compliance with this policy poses a number of significant challenges, not least of which is the meeting of professional accreditation criteria. Acquiring a recognized professional body accreditation, like that of the Australian Computer Society (ACS), is pivotal for all IT Australian programs, in that, it is a vital quality assurance measure and it enhances program marketability.

For an ACS accreditation, the course structure and content of the IT program is examined against the Society's defined core body of knowledge (CBOK) which covers both generic and ICT specific skill sets. This paper describes the current Bachelor of Science in Information Technology degree structure with respect to the ACS's CBOK. Within this framework, a possible strategy is proposed for realizing the University's LiWC policy whilst conforming to accreditation requirements. Finally the advantages and disadvantages of the proposed approach are discussed.

INTRODUCTION

At Victoria University (VU) a new initiative has been launched in 2007 to ensure that all teaching programs 'will create job ready and community aware graduates whose courses have at least 25% learning in the workplace, including opportunities for service learning in the community' (Aitken & Mitchell, 2007). To implement this initiative, a new Learning in the Workplace and Community Policy (LiWC) has as its goal that workplace contextual learning be embedded in all course deliveries. Scheduled for progressive implementation by 2010, the policy requires that a minimum of 25% of program content and assessment must be related to work integrated learning. The task to realise this policy has resulted in an extensive review of existing approaches to learning and teaching in all programs across the University.

The compliance with the LiWC policy will pose significant challenges for the Information Technology (IT) course in the School of Computer Science and Mathematics, not least of which is the meeting of professional accreditation criteria. Acquiring a recognized professional body accreditation, like that of the Australian Computer Society (ACS), is pivotal for all IT Australian programs, in that, it is a vital quality assurance measure and it enhances program marketability. This paper outlines the details of the academic skill sets in an IT program necessary to attain a professional level accreditation. It examines the current ACS professionally accredited IT undergraduate program at VU and its mapping to the defined skill sets. A proposed model to incorporate the 25% LiWC component whilst complying with

accreditation requirements in the IT program is detailed. Finally, the advantages and disadvantages of adopting this model will be discussed.

ACS ACCREDITATION FOR ICT PROGRAMS

Acquiring a recognized professional body accreditation is pivotal for all quality, technically-based, academic programs. In particular, such endorsement is vital as a quality assurance measure for courses which have a major component of Information and Communications Technology (ICT) content. It acts as the basis of national and international benchmarking of ICT professional education and it shapes the curricula (Harman & Meek, 2000, p. 3; Collings et al., 2005). The endorsement of a professional accreditation ensures international credibility and it enhances the marketability of academic programs (ACS, 2003; Jones & Price, 2002; Tan & Venables, 2007; Ramakrishnan, 2007).

The ACS is the professional body responsible for the assessment of all Australian higher education ICT courses accreditation ensuring that their programs are robust by assessing the suitability of potential graduates to act as ICT professionals. There are two different grades of accreditation: the Professional level for courses with a major IT focus, and the Associate level for other IT related programs. Both levels are examined against the course content and structure against the Society's defined core body of knowledge (CBOK). It is important to note that the ACS view is 'The CBOK does not in itself constitute a curriculum; it is more a scoping exercise of the disciplines involved in information and communications technology that should be considered in the establishment of a curriculum' (ACS, 2003, p. 9). The CBOK comprises both generic and ICT specific skill sets, as detailed in Table 1 and for accreditation, coverage of both sets of skills is mandatory. Students need to develop their technological knowledge whilst practising their communication, team building and problem solving skills throughout their studies. This emphasis on communication skills is particularly important as employers perceive computing graduates to be inadequately equipped in these skills. According to employers, students need to: learn better how to cope with the practical challenges in current technologies adoption; acquire strong communication skills and business aptitude and, better develop problem-solving skills (A C Nielsen Research Services, 2000; Taft, 2007).

Group 1- Generic CBOK	Group 2 – ICT Specific CBOK
Interpersonal Communications	Data Structures and Algorithms
	Program Design and Implementation
	Software Engineering and Methodologies
Ethics/Social Implications/Professional Practice	Information Security
	Conceptual Modeling
	Systems Analysis and Design
	Database Management
Project Management and Quality Principles	Computer Organization and Architecture
	Systems Software
	Data Communications and Networks
	Discrete Mathematics

Table 1: *ACS Core Body of Knowledge (CBOK)*

The depth to which Group 2- ICT specific skills are taught is somewhat dependent upon the discipline specialization of a degree program. The ACS recognizes that it is impossible for each undergraduate to learn every topic in the discipline to an advanced level. Rather, the above ICT specific knowledge must be covered to an intermediate depth in all programs. Institutions are encouraged to offer further units in any of the ICT specific areas of knowledge to an advanced level, and in doing so they are able to tailor-make programs in different specializations such as computer engineering, software engineering, information systems and information technology. For instance, information technology courses would emphasize advanced knowledge in Conceptual Modeling, Software Engineering and Methodologies, and System Analysis and Design.

CURRENT PRACTICE

The IT degree at VU is a three-year full-time program and its current structure satisfies the ACS Professional level of accreditation, in that, there is a minimum of one equivalent full time year of ICT material, with at least one third of this material being studied at an advanced level. These advanced topics must provide extra breadth and depth of ICT knowledge. Table 2 shows a detailed mapping of the core unit of study offerings of the IT program at VU against the introductory, intermediate and advanced knowledge levels of Group 1 and Group 2 CBOK. Electives are not shown as they are not essential in ensuring coverage of the CBOK areas.

Group	CBOK Areas	Unit of Study	Level of CBOK Knowledge		
			introductory	intermediate	advanced
1	Ethics/Social/ Professional Practice	Introduction to Computing & the Internet			
		Project 1			
		Project 2			
	Interpersonal Communications	Professional Communication			
		Project 2			
	Project Management & Quality Assurance	Project 1			
		Project 2			
		Applied Statistics			
2	Computer Organisation & Architecture	Computer Systems & Architectures			
	Conceptual Modeling	Database Systems 1			
		Database Systems 2			
		Intelligent Systems			
	Database Management	Database Systems 1			
		Database Systems 2			
	Data Communications & Networks	Data Communications & Networks 1			
	Data Structures & Algorithms	Object Oriented Programming 1			
	Discrete Math	Discrete Mathematics			
	Program Design & Implementation	Programming 1			
		Programming 2			
	Information Security	Introduction to Computing & the Internet			
		Data Communications & Networks 1			
	Software Engineering & Methodologies	Software Engineering 1			
		Software Development			
		Software Engineering 2			
	Systems Analysis & Design	Software Development			
		Object Oriented Analysis & Design			
	Systems Software	Operating Systems			

Table 2: *ACS CBOK skills as covered by core Units of Study at Victoria University*

The current IT program comprises of a total of 24 units of study over 6 academic semesters, as illustrated in Figure 1. In the first year, students are introduced to core subjects in information technology by covering the CBOK skills at an introductory level (shaded yellow), the second year covers CBOK skills at an intermediate level (shaded green) followed advanced IT knowledge in the final year of the IT degree (shaded aqua). A significant part of the IT degree is an industry-based

capstone project which gives students the opportunity to work in a team on a real-life software development problem. The Project spans two semesters in the final year of study and it is studied with a co-requisite unit in Professional Communication designed to further develop the necessary advanced written and oral communication skills for successful completion of the Project. Through these 3 units (shaded orange), students experience the practical challenges of building software systems and develop negotiation and listening abilities whilst honing their presentation and marketing skills. Additionally, elective units, at suitable levels, provide students with the flexibility to pursue their particular computing strengths and interests.

Year Level	Units of Study							
	Semester 1				Semester 2			
1	Introduction to Computing & the Internet	Program-ming 1	Database Systems 1	Discrete Maths	Computer Systems & Architecture	Program-ming 2	Non ICT specific unit	Non ICT specific unit
2	Software Engineering 1	Object Oriented Program-ming 1	Database Systems 2	Operating Systems	Data Comm^{n}. & Networks	Software Develop-ment	Elective 1	Elective 2
3	Software Engineering 2	Object Oriented Analysis & Design	Project 1	Professional Comm^{n}.	Project 2	Intelligent Systems	Elective 3	Elective 4

Figure 1: *Current IT program structure*

The scheduled implementation of the LiWC Policy to incorporate a minimum of 25% of work integrated learning in course content and assessment has brought the current IT degree program under scrutiny. Currently, the LiWC practice amounts to only half of the required 25% LiWC component, and it is realized by the Project and Professional Communication units (3 out of 24 units).

DECIDING ON AN APPROPRIATE MODEL

Several different approaches for matching the LiWC requirements are possible. On the one hand, the LiWC material could be integrated into every unit of study or, on other hand, the LiWC component could be segregated into an additional and separate part and then added to the current program. For LiWC to be integrated within the current program, closer examination shows that it will be impractical to insist that every unit of study be rewritten to incorporate workplace learning. For instance, some theoretical units like Discrete Mathematics, by their nature, do not lend themselves to immediate practical application in the workplace; rather they form a basis upon which other material can be framed. A more pragmatic approach would be to gradually introduce a LiWC component into one unit in the first year, two units in the second year, culminating in with current Project and Professional Communication units of the third year.

Alternatively, the inclusion of a specific and separate Work Placement component in a course benefits the students through exposure to technical and business mentoring, current industry practices, and an opportunity to clarify career goals (Calway, 2006; Trigwell & Reid, 1998). Therefore, it is preferable for an IT course to comprise two distinct, yet complementary, parts: the traditional course offering followed by a work integrated learning component. This strategy can be achieved through the introduction of an additional one-year long co-operative education internship or the replacement of

several units with a final semester workplace experience (Tan, 2008). However, the choice of the most appropriate strategy needs to be made with consideration of its impact upon the program's ability to fulfil ACS accreditation requirements.

On first inspection, retaining the current course structure and adding an additional year to the program to accommodate learning in the workplace is a viable option as it would not impact upon the ACS level of accreditation. Such an approach would make the program unattractive to both local and international students due to the time and financial costs associated with an additional one year internship. More attractive to students, is any option where program duration remains at 3 years. To maintain a three-year duration needs further consideration, as incorporating the 25% LiWC component into the existing program requires the addition of 3 LiWC units. This can be achieved by either sacrificing 3 existing core units in the current first and second years of study or alternatively, substituting 3 electives from the overall program. Either way, the implementation should not weaken the intellectual rigor appropriate to an IT course nor have a negative impact upon the level to which the CBOK can be covered. Poor selection of units would risk the downgrading of the current program's ACS accreditation from Professional to the less marketable Associate level.

In view of the argument that only an authentic workplace can provide "on-the-job experiences to students prior to graduation" (Carpenter, 2003, p. 201), substituting 3 electives to create a semester-long workplace component is the preferred option. In this strategy, the work-based component is separated from the academic content whilst still fitting both learning components into a standard three-year course. This approach encourages students' initiative and commitment to their own learning as the work placement/internship is a core component of the course and an academic requirement at the same time; all students must complete it. In this proposal, the five semesters of the previous program content is retained with the final semester replaced by an industry-based internship, as shown in Figure 2. Note that the mandatory units in the fifth semester, the capstone Project (albeit now reduced to one unit) and Professional Communication unit remain in the course and help prepare students for the internship. Careful scrutiny of this approach shows that the new course structure is still compliant with the Professional level accreditation requirements, in part due to the inclusion of an advanced study of Software Engineering late in second year (shaded aqua) and the semester long Work Placement covered in the final year (shaded orange) whilst complying with the 25% LiWC policy. Adoption of this approach will impact upon course assessment and administration and, in particular, management of the Work Placement will require substantial additional resources and support.

Year Level	**Units of Study**							
	Semester 1				**Semester 2**			
1	Introduction to Computing & the Internet	Program-ming 1	Database Systems 1	Discrete Maths	Computer Systems & Architecture	Program-ming 2	Non ICT specific unit	Non ICT specific unit
2	Software Engineering 1	Object Oriented Program-ming 1	Database Systems 2	Operating Systems	Data Comm^{n}. & Networks	Software Develop-ment	Software Engineering 2	Elective 1
3	Intelligent Systems	Object Oriented Analysis & Design	Project 1	Professional Comm^{n}.	**Work Placement**			

Figure 2: *A proposed course structure to achieve 25% LiWC experience*

THE IMPACT

With the introduction of the semester long Work Placement, there will be a considerable need for academic and administrative support to manage the internships. Selection of appropriate placements will need to be made in consideration of the relevance of the work experience to be gained. Therefore criteria for assessing the validity and quality of each placement need development. Additionally, the academic coordinator will need the assistance of a dedicated Work Placement coordinator who will manage the practical aspects of facilitating Work Placement.

Of course, pivotal to the successful implementation of this approach is a steady supply of LiWC opportunities with good industry partnerships for large numbers of students. Importantly, in cases where demand exceeds supply of placements, additional pressure would be exerted on the School to find suitable placements to cater for such shortages.

One benefit of the proposed approach is that there is no immediate need to revamp assessment for existing units; only the Work Placement component will require new assessment practices to be put in place. Therefore the effort can be concentrated in developing appropriate assessment models to evaluate the merit of students' LiWC experiences. The challenge will be to find assessment that places value on a disparate range of student workplace experiences. Criteria for grading will need to be flexible and take into account student progress and skill acquisition throughout the Work Placement.

Finally, consideration needs to be given to an option of allowing international students to undertake the co-operative program in their home countries; and if allowed, this option will require considerable management and additional resources. Similar concerns are raised for offshore partner institutions involved in the delivery of the IT course offshore, in that, there may be implications including issues such as overseas jurisdictions, contractual arrangements and the availability of resources and support (Kay & Russell, 2008).

CONCLUSION

An important lynch pin of our traditional IT degree program has been project-based learning for students which is achieved through industry sponsored projects. The introduction of LiWC policy at the University has mandated that these experiences should comprise a minimum of 25% of course content and assessment. Retrofitting the current course structure to surmount this hurdle has seen 3 electives replaced by a final semester Work Placement, in part, to maintain a three-year program duration.

This approach maintains the strength of the ACS Professional accreditation through the retention of ICT specific core units. The addition of a Work Placement component in the program matches the emphasis that the ACS places upon contextual IT and social competencies needed by graduates in their professional practice. The proposed IT program gives students the opportunity to sharpen their generic and ICT specific skills thereby enriching their learning experiences and enhancing their employment prospects.

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Tantisantisom, K. and Clayden, J., Edith Cowan University, Australia

Decision Support Systems to Support International Students: Potential for Practice?

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ABSTRACT

International students now comprise a significant group within Australian higher education but many must overcome difficulties related to initial acceptance by the institution of their choice and enrolment in an appropriate course. The need to extend visas to permit completion or the application process for permanent resident status may also be important to the individual student.

Decision support systems (DSS) for customer relationship management (CRM) have been suggested as a means of utilising information technologies for admission procedures in higher education (McClea & Yen 2005). This paper will consider whether students may be defined as customers and reflect upon the possible introduction of a decision support system to facilitate the admission and satisfactory progress of international students through their courses. It will focus upon the experiences of international students and academic staff in the School of Computer and Information Science of Edith Cowan University.

INTRODUCTION

Within the last decade Australia has become one of the largest educational providers for international students (Marginson & Eijkman 2007). Several Australian universities have diversified to the extent that they now have large cohorts of on-shore international students. Edith Cowan University in Perth, Western Australia, is one such university. Much of the motivation for expansion has been financial: for example, those domestic students who have to pay full tuition fees will pay $A9,390 for the first year of the Bachelor of Computer Science while international students have to pay $A16,000 for the same tuition in an identical environment (ECU, n.d.).

The more on-shore international students universities enrol, the more revenue they will receive. This income contributes to better university facilities and services for all their students and staff. The financial importance of ensuring positive experiences for international on-shore students is obvious: disappointed students may change universities within Australia, return to their homeland or decide to relocate to another country in order to complete their studies.

DIFFICULTIES FACED IN STUDYING ABROAD

Prospective students wishing to complete a Master's degree from the School of Computer and Information Science at Edith Cowan University may choose any of one of 19 available courses (SCIS, 2008). Which courses are the most suitable for individual students and their current or future jobs? Although the availability of a variety of courses is one of most desirable factors for prospective

students (Joseph, Yakhou & Stone 2005), course selection is not a simple process. Even though a course handbook, information provided on the website and suggestions from alumni may help, a system which is able to analyse student personalities and job-related requirements would be more helpful.

Furthermore, even a current post-graduate student may be confused when it comes to choosing appropriate units from the number available. However, interesting the units, if students do not have adequate background knowledge of the content, they and the lecturer will experience difficulties. A system which is able to offer appropriate suggestions in unit enrolment based on academic background and course prerequisites seems more advantageous. As a consequence, enrolling in the right course and right units with some help from information technology may improve student sustainability within academic organisations.

Each semester, when it is time for students to enrol in new units, helpful suggestions from someone who knows about the unit enrolment process, prerequisites and has detailed knowledge of the content would smooth the progress of international students. However, international students may struggle to find good advice from an appropriate advisor if they are living in a country where there are neither friends nor family or where they know no-one who has previously studied the same course or even worked in the same area of specialisation. In this case, academic staff or course coordinators may help. Quality of service from university staff is one of the most important factors that students expect from their university (Joseph, Yakhou, & Stone 2005).

If universities can offer relevant services to their students, they will be able to sustain their students throughout the educational processes. However, insufficient numbers of staff or inadequately knowledgeable staff may cause or aggravate students' problems (Kapeliuk, Reich & Bar-Lev 2004). Inadequate part-time staff attempting to take care of a number of students' difficulties in a short period of time, on a case by case basis, may not offer optimum solutions to students' problems. Furthermore, convenient accessibility of both academic and administrative staff is also ranked in the top of prospective students' desires (Joseph, Yakhou, & Stone 2005). This may also apply to international students.

Furthermore, in the view of international students, language difficulties also hinder their attempts to make contact with university staff. English language proficiency is a major factor in environmental adaptation for foreign students (Ng 2006; Rosenthal, Russell & Thompson 2007). Emotional problems, socioeconomic background and study difficulties may also have a negative impact on student achievement (Kapeliuk, Reich & Bar-Lev 2004).

ALLEVIATION OF INSECURITY

Researchers suggest different ways of supporting and encouraging overseas students to adjust happily and quickly to the new host country. One suggestion is that students should bring personal belongings from home to alleviate home sickness (Ryan & Ogilvie, 2001). It is obvious that international students usually link their pleasures in their home country to similar things that they can derive from the host country (Ryan & Ogilvie, 2001). As strangers in a new place, it is not easy to acquire information related to their own interests and pleasures, such as places that remind overseas students of their home country or even traditional food outlets and restaurants. Living alone for the first time in an unfamiliar country and having no-one to answer questions isolates students and strengthens any negative first impressions they may have.

An introductory tour of the university city and an outline of available community services would assist international students to adjust rapidly to their new environment. Positive contact with local people may also improve the mental well-being of international students (Rosenthal, Russell & Thomson 2007). Such contact may not only improve bad days for international students but also make them feel more welcome. Nevertheless, obvious different cultural beliefs, particularly between western and

Asian cultures, may cause students to have negative expectation (Ryan & Ogilvie, 2001). For instance, people from western cultures are often independent and self-sufficient, while dependence is another way of demonstrating intimate relationships in the Asian culture (Ryan & Ogilvie, 2001).

Another suggested way to accelerate the adjustment process for international students, particularly Asian students, is for them to be able to join in religious and culturally-specific activities (Rosenthal, Russell & Thomson 2007). Students may seek information about religious and cultural institutions in the local and academic environment as soon as they arrive to commence their course. This paper contends that students would benefit from information about cultural and social activities being readily available before their arrival. Availability of such information may confirm that international students have each chosen a course and institution which will offer a positive experience.

The authors of this paper, through participation in and coordination of a Research Methods unit in the School of Computer and Information Science, have met many international students. Indeed, Australian-born students regularly comprise a minor subgroup of the classes. The authors have conducted informal nominal group technique (NGT) sessions and have asked students to interview each other and report about their experiences as international students. A recent class discussion identified the following as the most important information needs for international students. In no particular order, advice was needed about:

- Academic life in Australia
- Where to get legal advice
- Accommodation services
- Part-time work and the legal and visa implications of working as a student
- Places of worship
- Medical and health services
- Australian slang
- Coping mechanisms
- Government agencies and departments at federal, state and local levels
- Social gatherings, at the university and outside
- Student associations
- Scholarships
- Connections with people of their own cultural or ethnic background
- Counselling services
- Food shopping and restaurants

These findings echo the results of an earlier formal study conducted by Singh and Armstrong in 2006. The authors examined issues of academic and social integration and satisfaction with the university experience. Critical needs for improvement were identified as being course-specific academic orientation programs, provision for English-language development and the addition of a range of social activities to promote staff-student and student-student interactions.

No criticisms of existing services of the School or University are implied by these findings. The University has played a significant role in helping international students adjust to their new environment. However, staff resignation or retirement causes the loss of corporate memory and skills in dealing with student problems. It has been suggested that it is a good idea to provide ongoing training to staff working with international students (Alberts 2007). Student communication difficulties may also be compounded by a lack of knowledge of where to go for support. Although a number of information systems have been developed in order to assist universities and students for academic, administrative and social purposes, people whom international students are able to ask for help are still required (Rosenthal, Russell & Thomson 2007).

The School's intention to improve its website for the recruitment of international students does not mean it plans to offer less personal support to individual students. However, the new website may be enhanced by the subsequent addition of advice about living in Perth.

DECISION SUPPORT SYSTEMS IN UNIVERSITIES

Even though information technology has been applied to a wide range of university activities, not many of these applications have implemented for the purpose of directly assisting student adjustment. McClea and Yen (2005) describe the application of databases in customer relationship management (CRM) within enterprise resource planning (ERP) to the admission process in order to screen students before university admission.

Another example is the system developed for the use of decision support systems for the purpose of prioritising several information system projects (Dutta & Burgess 2003). Additionally, a decision support system for a university library was developed with the purpose of selecting appropriate books for purchase from a number of available book lists (Uzoka & Ijatuyi 2005).

A proposed decision support system which used case-based relationships (CBR) to prevent students from dropping out of their courses, was designed to assist in providing appropriate suggestions to students, regardless of the time involved and staff experiences (Kapeliuk, Reich & Bar-Lev 2004). Although this system produced satisfactory results, it was focused solely on academic achievement.

From these examples, it can be seen that a number of decision support systems or information systems has been applied for the use of university activities rather than for the direct benefit of students. Although such decision support systems may facilitate university activities which lead to benefits for students, students lack a system that helps them to solve their own problems.

PROPOSED FRAMEWORK

Figure 1 below is a stylised representation of the decision support framework proposed to support international students in the School of Computer and Information Science of Edith Cowan University.

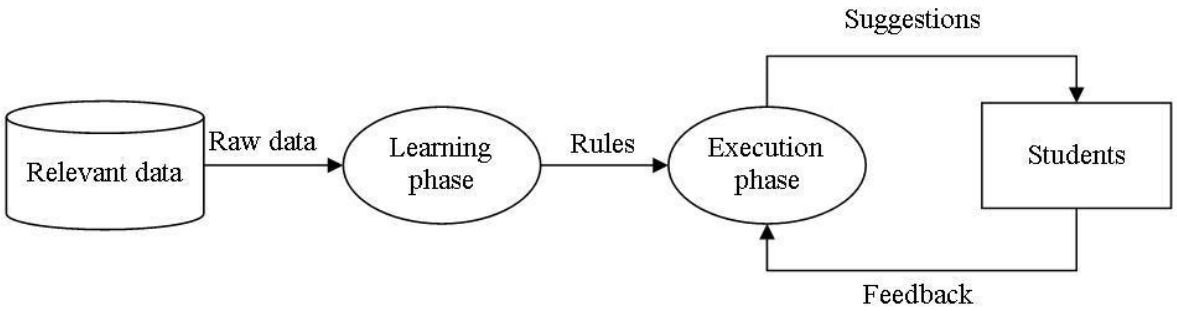

Figure 1: Decision Support System Framework for Students

The proposed system consists of two phases: the learning phase and the execution phase. The learning phase (see Figure 2) will investigate into a number of major student-related activities that may aid in generating a suitable initial rule set. The initial rule set will be generated from a student-related database through a learning approach; this is to avoid uncertainty based upon varied opinions among experts in this area. The outcome in this step is the rule set used in decision-making processes.

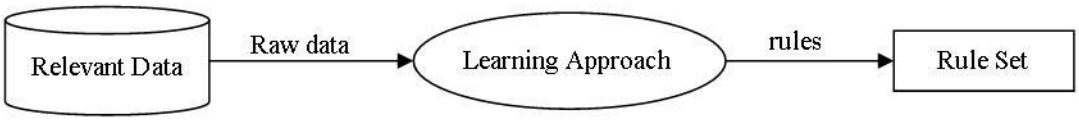

Figure 2: The learning phase to acquire fuzzy set rules.

The generation of fuzzy rules is processed by finding patterns corresponding to student interest and preferences. The rules are created in forms of "if-then", and once a new rule is created, it will be checked with previously created rules within the knowledge base. If the new rule is not the same as one of existing rules, the system adds the new one into the knowledge base.

However, there is a chance that the newly created rule is incompatible with an existing rule. In other words, these two rule share the same *if-part* but different *then-part*. In case of conflicting rules, the use of a weighted value of each rule corresponding to matching data pairs generated for each rule will be applied. This weighted value is calculated and used in the form of a real number. The maximum weight for each rule is 1.0 and minimum weight for each rule is 0.0. This method uses weighted value for calculating and weighting decisions provided to the students. Therefore, the rule is adjusted to be the form of "if-then-with".

If *property A is true* [and *property B is true*],
then *activity C should be proposed* with *weight value of D*

The decision-making process can be compared to a condition-action approach that is within the representative forms of these fuzzy rules. Moreover, a neural network's learning ability, which imitates a human's learning process, will support the system for changing environments. From this, the rule adjustment components within the execution phase (see Figure 3), which is the usage of neural networks to adjust these fuzzy rules in order to improve the fuzzy rules' effectiveness, increases the level of intelligence within the proposed system.

In the execution phase (see Figure 3), whenever students require information for making decisions, the rule set from the previous stage will be processed by the fuzzy logic agent to suggest alternatives. To enhance the proposed system's performance, the continuous learning capability is applied by continually obtaining student feedback to improve fuzzy rules used for providing suggestions. Feedback from students will supply additional inputs for the rule matching module in order to retrieve fuzzy logic rules related to the obtained feedback. The feedback may be in forms of the increasing or decreasing number of student preferences to the suggestions they obtain. Then the outputs of the rule matching module which are the feedback from students and relevant fuzzy logic rules will become inputs of the neural networks module afterward. This neural networks module will be responsible for examining the provided feedback and the corresponding feedback in order to refine the weight value in relevant fuzzy logic rules. This will further improve the efficiency in sourcing further solution suggestions.

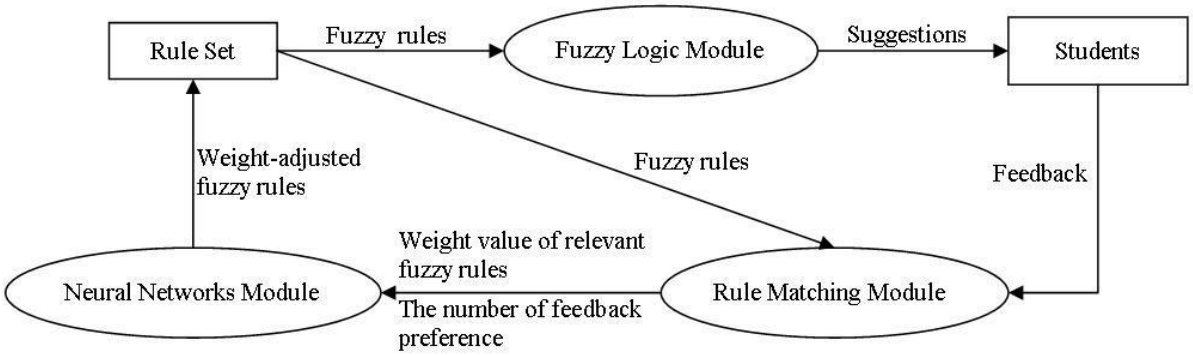

Figure 3: The execution phase to adjust rule weight.

In this proposed system, the fuzzy logic module and the neural networks module will collaborate. The neural networks module will process related inputs to generate output that leads to adjusted fuzzy logic rules. This technique becomes a hybrid system that employs approaches interacting with each other in order to accomplish the required tasks (Jacobsen, 1998).

Information resources directed towards supporting international students after their enrolment in courses offered by the School will be incorporated initially into an historical database. On one level, the DSS will benefit local and international students by providing easy access to course and unit advice. In addition, social, residential and medical, health and legal advice will be maintained and kept up-to-date by DSS functionality. The valuable experiences and understandings of staff and students will be retained through their contributions to the DSS. The provision of much-needed information through a user-friendly interface is likely to enhance the international student experience and permit teaching and research staff to focus more specifically on academic activities with their students. Ultimately the reputation of the School and the University, and its ability to recruit students, will be enhanced by the questions asked and answered through an effective DSS.

CONCLUSION

This paper has discussed the conditions for the suggested implementation of a DSS to assist onshore international students of the School of Computer and Information Science at Edith Cowan University. The implementation of the DSS is envisaged as the next stage of an ongoing project within the School as it seeks to enhance the international student experience and contribute to the sustainability of its courses in a global market.

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Tantisureepom, S. and Armstrong, L., Edith Cowan University, Australia

Introducing a New Technology to Enhance Community Sustainability: An Investigation of the Possibilities of Sun Spots

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ABSTRACT

The introduction of the Sun SPOT, Small Programmable Object Technology, developed by Sun Microsystems has been depicted as providing a revolutionary change in cyber physical interaction. Based on Sun Java Micro Edition (ME), this sensor technology has the potential to be used across a number of discipline areas to interface with systems, the environment and biological domains. This paper will outline the potential of Sun SPOTs to enhance community sustainability. An action based research project was carried out to investigate the potential uses of these technologies and develop a prototype system as a proof of concept. The research will compare Sun SPOTs with similar technologies, provide an assessment of the technology, and propose a number of possible implementations of the technology to enhance community sustainability.

INTRODUCTION

The emergence of mobile and wireless technologies has revolutionized both personal and business communications. Examples of such devices include remote and radio frequency (RF) sensor technologies, mobile phones, personal digital assistants (PDAs), navmans, ipods, wireless keyboards and laptops (Liang, 2008). Various communications technology media, such as wireless local area networks (LANs), wide area networks (WANs), mobile phone networks, RF technologies and satellite technologies support the transmission of data to these devices. While the mobile phone has emerged as the modern device for voice and data communication, a role also exists for wireless sensor technologies to interface with the biological and physical domains. Earlier examples of these technologies include the ZigBee sensor. However, it is known to be difficult to program and customize.

Recent developments by Sun Microsystems have resulted in the release of the Sun SPOT technology. It is evident that such a technology could revolutionize the role of sensor technology in many contexts. This paper will explore the future role of Sun SPOT technology and its potential to enhance community sustainability across a number of industrial uses. The paper will firstly outline the background to the emergence of Sun SPOT technology, describe and detail the Sun SPOT technology, outline the potential for its use across a number of fields. The paper will also describe a proof of concept system which has been developed using Sun SPOT technologies. The potential of the Sun SPOT technology will be discussed and its role in improving community sustainability explored.

BACKGROUND

Java has emerged as an industry standard software development platform for both desktop, server and mobile devices. The Java programming language originated in 1991 as the Oak programming

language. It was originally designed for embedded chips in consumer electronic appliances. However, its applicability has far exceeded that expectation. The language was rebadged from Oak to Java and further developed to suit an increasing demand for Internet applications (Liang, 2008). The first revolution in Java's history was the Java 2 Platform, Enterprise Edition (J2EE). It was designed for creating server-side applications such as Java servlets and Java Server Pages (JSPs). The second Java revolution was the development of Java 2 Platform, Micro Edition (J2ME) (Li and Knudsen, 2005). J2ME was developed in order to create applications which could be used by devices that had resource limitations. These devices ranged from cell phones, PDAs, to small computers. In other words, J2ME is "Java for small devices" (Li and Knudsen, 2005). Java, as a software development technology, is highly accepted as an industry standard all over the world. More than 6 billion devices are running Java, over 1 billion on mobiles (Sun Microsystems, 2007). Recent advances in the Java development platform has resulted in the release of the Sun SPOT.

SUN SPOT TECHNOLOGY

Sun SPOT is predicted to be the next generation electronic device that will allow developers to build applications in the Java Development Environment (Sun Microsystems, 2007). Each Sun SPOT consists of a processor board and a sensor board. The processor board contains a *180 MHz 32-bit ARM 920T core processor* with *512K RAM* and *4M Flash*. The board also has a *2.4 GHz radio* with an integrated antenna. The radio is implemented on *IEEE 802.15.4*. The original sensor board has a *3-axis accelerometer* used to sense the orientation and acceleration of Sun SPOT, a *temperature sensor*, a *light sensor*, *8 tri-color LEDs*, *6 analog inputs*, *2 switches*, *5 general purpose I/O pins* and *4 high current output pins*. Many more devices such as global positioning systems (GPS), humidity sensors, and liquid sensors, may be integrated to Sun SPOT through general I/O pins and analog pins. These add-on devices allow the Sun SPOT to be used to record different physical parameters. The Sun SPOT operating system, Squawk, is based on the Java ME virtual machine implementation and supports the CLDC 1.1 and MIDP 1.0 profiles. The virtual machine executes directly from flash memory. In addition, all device drivers are written in Java (Sun Microsystems, 2007). Figure 1 illustrates Sun SPOT features.

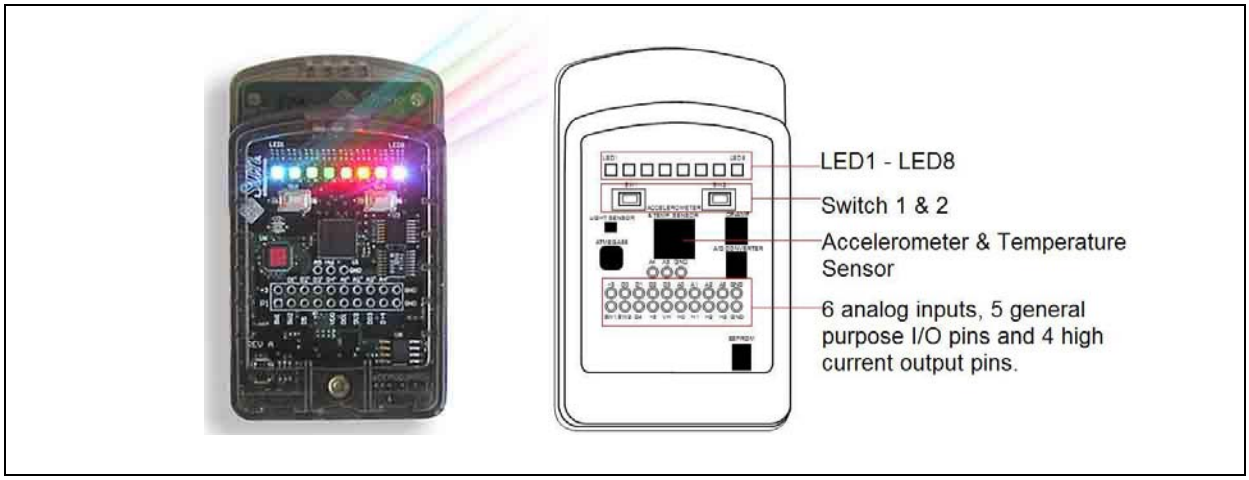


Figure 1: Sun SPOT features (Sun Labs, 2007; Ritter, 2006-2007)

POTENTIAL INDUSTRIAL USES OF SUN SPOTS

The following sections will detail potential uses of Sun SPOT technologies. A number of contexts, including the agriculture and environmental systems, will be considered.

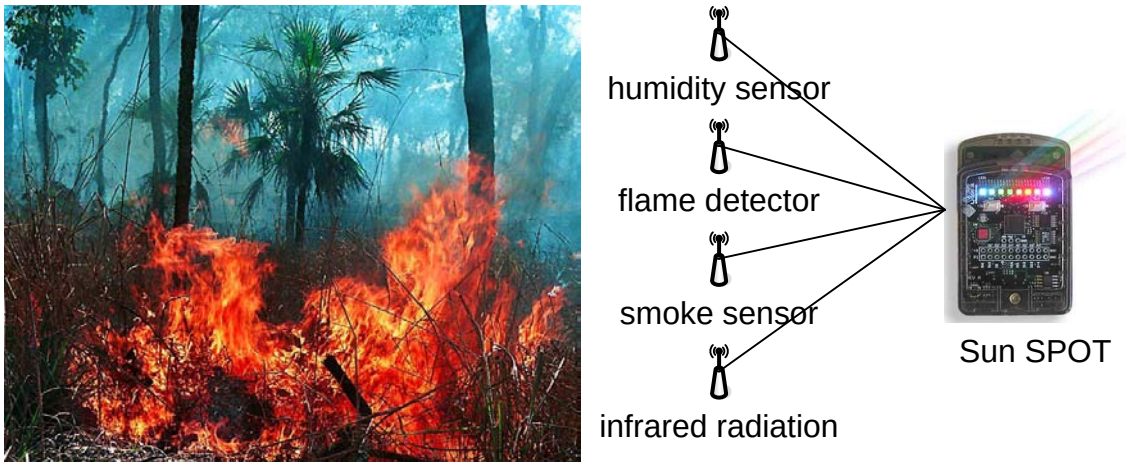
As the world's population increases, there is a need for more efficient farming systems. Many farming enterprises are investigating ways to become more economically sustainable through automation. For

example, Yenu Wan (Wan et al., 2008) reported on the use of sensor technology to improve farm management in Taiwan. This paper reported on the use of ZigBee based remote sensors for poultry management. Wan et al. (2008) suggested that using sensor technology would improve farm practices. However it may be difficult to automate traditional farming practices as it may initially be expensive. The use of automatic weather stations and field servers (FS) has been suggested as a solution to automate management activities. Field servers can provide a wide range of sensors, cameras, communication units and AD/IO units. One example of how these servers have been used is in operating manual curtains used to prevent chickens from being exposed to rain or for operating fans to deliver fresh air. Another advantage of using such sensor technology is that it may be controlled remotely through a computer based station. FS sensor technology may also be useful in allowing a farm manager to monitor farm activity though cameras situated remotely throughout the farm. The farmers may collect data from temperature, wind and humidity sensors to assist with climate management. It might be possible for Sun SPOTs to be used in similar contexts.

Similar research by Tokihiro Fukatsu (Fukatsu et al., 2008) reported the extension of the application of the FS sensor technology through interfacing with a web server. This study developed a system using Java servlets to provide user control and to gather data from FS remotely via the Internet. This system provided a number of advantages, including convenience, ease of understanding, and a user friendly graphical interface. The research study reported that users could customize the application using profiles in order to control specific FS through assistant tools. Such a system might also be developed using the Sun SPOT technology.

The potential for using remote sensor technology for high-performance greenhouse environment control has recently been reported (Hoshi et al., 2008). This paper described an ubiquitous environment control system (UECS) to control greenhouse environments. The system had several nodes which served different purposes throughout the greenhouse. Some of the nodes were used to open or close a curtain, some were nutrient makers. Two systems were built, a time-programmed multi-environment control system and a hydroponic nutrient control system. These nodes were connected using a 10-Base-T Ethernet and a hub. Each node had its own custom-made IC chip configuration of the embedded low-cost microcomputer board for the UECS. They communicated with each other by using the common corresponding message (CCM) protocol. Hoshi et al. (2008) reported on the mechanism for sending packets of data. The packets could be sent using either broadcast or unicast methods, depending on the type of activity. CCM is implemented on an XML document. Hoshi et al. (2008) reported that the research results exceeded expectations and that the device was considered to be relatively economical. Sun SPOT technology might potentially be used in a similar context.

Sensors are widely used in many field situations. For example, research on the use of sensors for fire management in forest situations has been reported by Charvat et al. (2008). Effective fire hazard monitoring required each sensor node to include a flame detector with temperature, humidity, smoke, and infrared radiation sensor capabilities. The sensor nodes also needed to be able to exchange information with other nodes in order to evaluation the current fire hazard situation. After that, it was designed to feed all the information to the server through the Internet connection. This study reported systems that included a server which integrated information with other terrain databases to deliver fire hazard assessments to clients. The client's machine could be a stationary computer, a PDA, or a mobile phone. Sun SPOTs could be considered as strong candidates for use in fire hazard monitoring. Sun SPOTs capabilities to communicate via radio further enhance their suitability.



(Lang, 2000)

Figure 2: Potential use of Sun SPOTs with attached sensors for fire monitoring

PROOF OF CONCEPT SUN SPOT SYSTEM – The Magic Hand

The following section describes the development and testing as a proof of concept system using Sun SPOT technology. The Magic Hand system demonstrates the potential of Sun SPOT technology to be used in a game and/or entertainment context through its capability to replace the need to use a mouse as the principal user interface. Sun SPOTs may provide a means for disabled users with limited hand dexterity to use computer games. The sun SPOT is able to communicate by using radio signals; therefore, there is no need to attach any wires, which gives Sun SPOTs the ability to move freely in the air. The Sun SPOT controller receives signals from the base station and responds with data. The base station, then, registers the Sun SPOT into service and receives a data packet from the Sun SPOT. The Sun SPOT is capable of sensing its current position by using the accelerometer3D on the sensor board to calculate the different electronic signals at the nominated position (see Figure 3). Following this operation, the Sun SPOT places its current position into a data packet and sends it to the base station. At the base station, a data packet is received and a calculation of the variation in the SPOT's current position from the previous position is calculated. Each Sun SPOT has two general purpose switches which are designed to represent two important mouse activities, the left click and right click. This allows the mouse functionality command system to be altered accordingly.

This proof of concept system was developed which demonstrated how Sun SPOTs could be incorporated as the user interface into an existing computer game (see Figure 4). An initial assessment of the system indicated that the Sun SPOT could be used to manipulate the screen cursor movements. However, it required some level of practice to master and control the movement. Later prototypes are planned that will incorporate the Sun SPOT into a glove system that will allow greater levels of control for users with poor hand dexterity.

```
* Sun SPOT Movement: LH or RH;MM;positionX;positionY
* LH or RH = Left or Right hand
* MM = Movement
* positionX = the current x angle of the Sun SPOT
* positionY = the current y angle of the Sun SPOT
* ------------------------------------------------------------
*/

    Runnable r = new Runnable() {
        public void run() {
            while (true) {
                try {
                    String xPosition = String.valueOf(Math.toDegrees(accel.getTiltX() - absoluteZeroX));
                    String yPosition = String.valueOf(Math.toDegrees(accel.getTiltY() - absoluteZeroY));
                    String message = handRepresentative + ";" + Message.MOVEMENT + ";" + xPosition + ";" + yPosition;
                    //System.out.println(message);
                    messageSender(message);
                    Thread.sleep(sendingSpeed); // Choose speed from the speed pool
                } catch (IOException ex) {
                    System.err.println("Error in SunSpotMagicHand.startMovementWatchThread(): I/O Error!");
                    ex.printStackTrace();
                } catch (InterruptedException ex) {
                    System.err.println("Error in SunSpotMagicHand.startMovementWatchThread(): Interrupt Error!");
                    ex.printStackTrace();
                }
```

Figure 3: Code sample of Java code used to track cursor position of Magic Hand system.

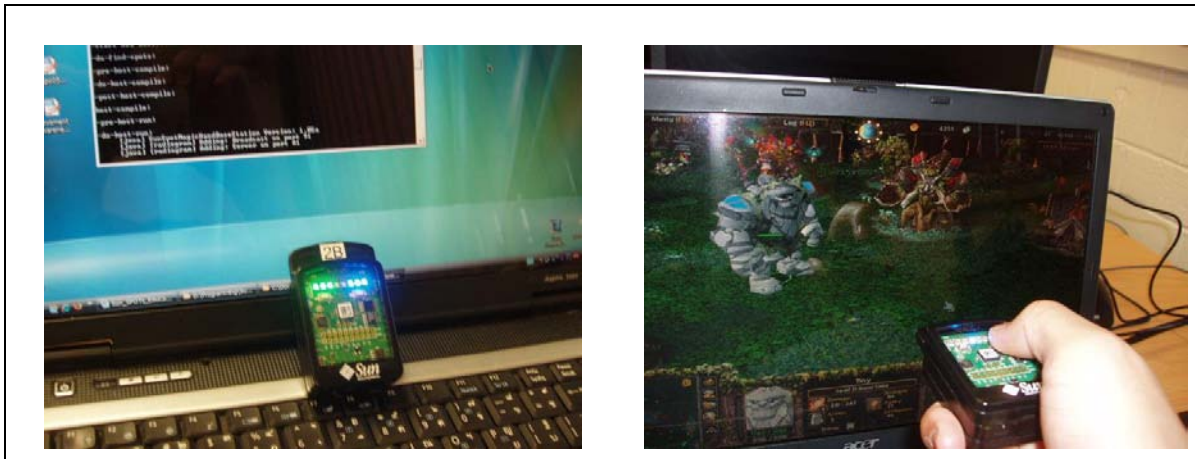


Figure 4: Sun SPOT communicates with base station (left), using Sun SPOT to control computer game (right)

FIELD TESTING

The following section details preliminary testing of the Sun SPOT technologies. In an effort to determine the limitations and strengths of the technology, a number of measurements were taken to assess the quality of service and signal strength between Sun SPOT sensor nodes. The preliminary experiment was designed to measure Sun SPOT radio signal strength between a Sun SPOT base station and a Sun SPOT in an open field area.

Preliminary testing was carried out at Edith Cowan University, Mt Lawley campus. A standard Sun SPOT base station and a Sun SPOT node were used for the experiment. According to Sun SPOT specifications (Sun Microsystems, 2005-2007), radio frequency signal output power may be set in a range from a lowest level of -32 to a highest level of 31. For the purpose of the initial testing, the power was set to the highest level of 31. Data was collected from the signal strength between the controller and the based station. The communication protocol used by the Sun SPOT was the Radiogram protocol. The Sun SPOT was programmed to send a data packet every 0.5 sec for 15 seconds in each interval. A measurement of radio signal strength was taken up to 40 meters at 5 meters intervals from the base station.

The use of the radiogram protocol allowed indicators to be calculated from each arriving data packet. These include received signal strength indicator (RSSI), a correlation value (CORR), and a link quality indication (LQI). An indication of the effect of distance from the based station on the RSSI is shown in Figure 5. According to the Sun SPOT specification (Sun Microsystems, 2005-2007), RSSI measures the strength of the signal from the packet. It may range from a weak signal of -60 to a strong signal of 60. An assessment of the data generated from the initial testing showed that there was a substantial decline in the level of RSSI from 40 points in the first 5 metres from the base station. By 20 metres, a weak signal was detected.

An assessment of quality of data transmission was also made by measuring the CORR factor; which was calculated from the average correlation value of the first 4 bytes of the packet header. A value of 110 indicates a maximum quality packet, whereas a value of 50 is generally the lowest quality packet detectable by the SPOT's receiver (Sun Microsystems, 2005-2007). The CORR factor was found to decrease marginally with distance from based station. No discernible differences were noted up to 25 metres distance the base station (Figure 6). The link quality indication (LQI) is a characterization of the quality of received packets from a Sun SPOT node. Its value is based on the CORR correlation value. According to the Sun SPOT specification, the LQI ranges from a low level of 0 to a high level of 25 (Sun Microsystems, 2005-2007). An assessment of the LQI indicated that it provided, as expected, similar results to the CORR factor (Figure 7).

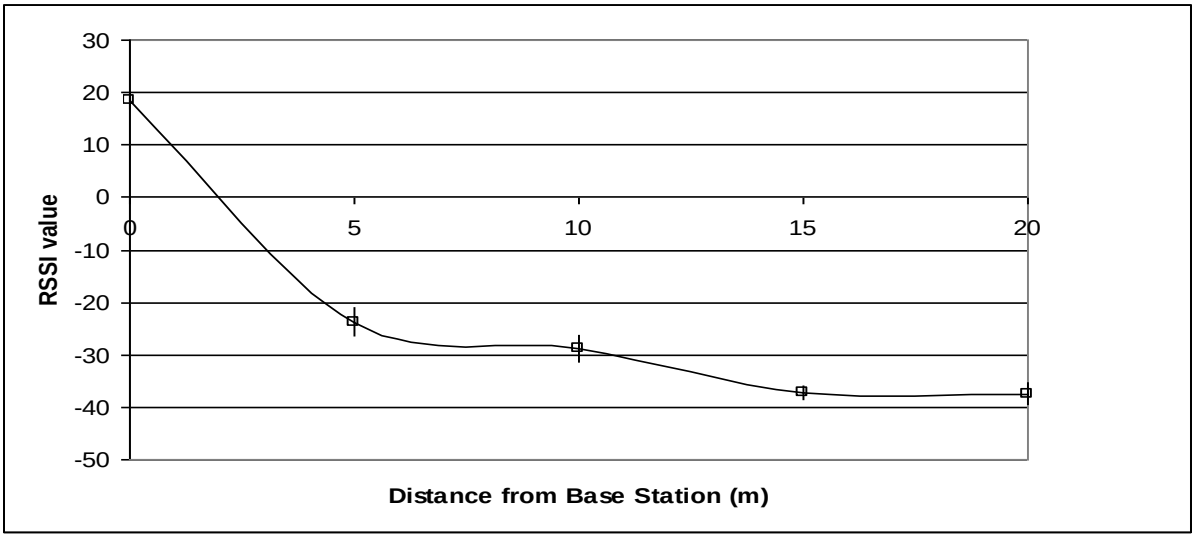


Figure 5: Change in Sun SPOT RSSI level with increasing distance from base station.

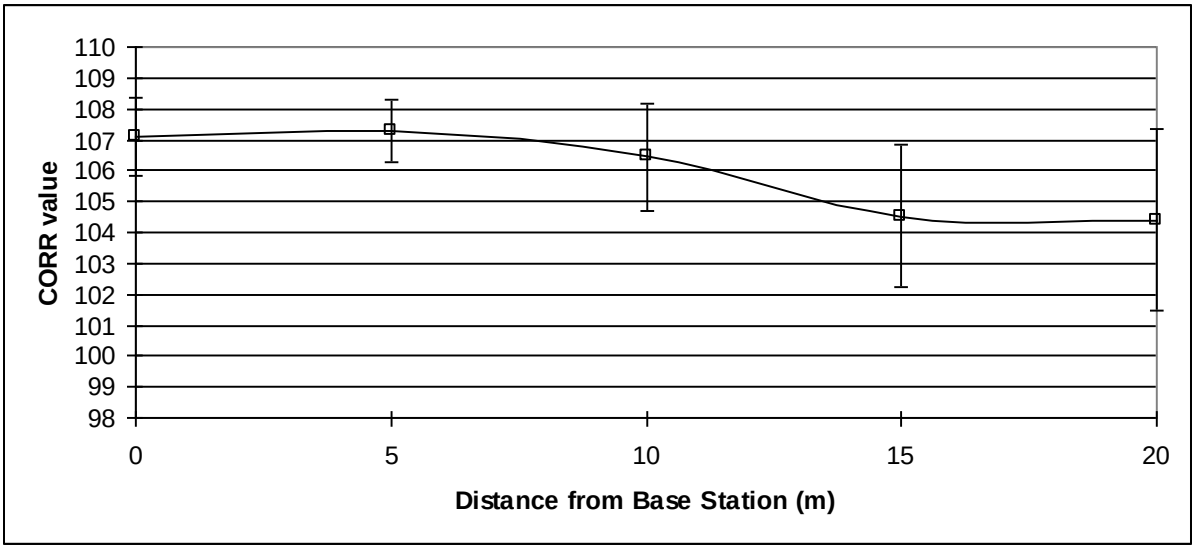


Figure 6: Change in Sun SPOT CORR level with increasing distance from base station.

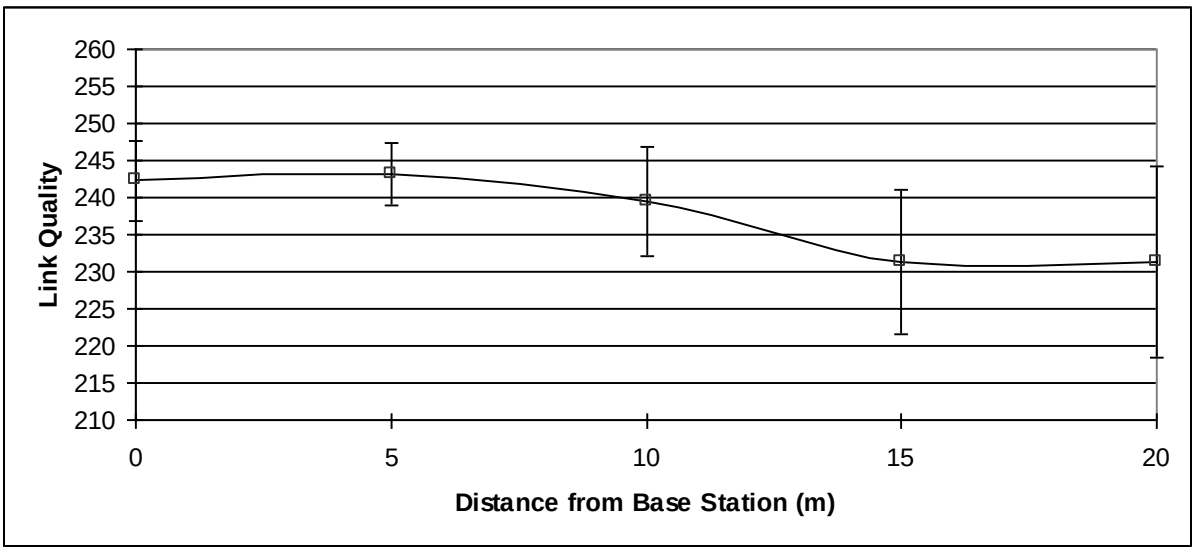


Figure 7: Change in Sun SPOT LQI level with increasing distance from base station.

DISCUSSION AND CONCLUSIONS

The potential for new information and communications technologies (ICT) to improve both the life of individuals and communities has been demonstrated in a number of contexts such as health and agriculture. Sun SPOTs is an example of a new ICT technology; as such it has provided an opportunity to investigate its potential to improve the social and economic sustainability of communities. This paper has explored how Sun SPOTs as a technology might provide similar functionality and capability to other sensor technologies to record important data, monitor environmental conditions, interface with other technologies, to allow automation and more efficient processing.

The Magic hand proof of concept system, as described in this paper, demonstrated the potential of Sun SPOTs to enhance the lives of the disabled and physically challenged by providing alternative means to interface with computers in general and more specifically games. While this paper explored how Sun SPOTs might contribute to improving a number of tasks in agriculture and environmental monitoring, it must be noted that a number of limitations were found with the technology as it exists in its current version. Field test results showed that the performance of Sun SPOTs may limit the quality of data transfer at distances over 25 metres.

The development of any technology is an iterative process and the limitations which have been identified here are likely to be rectified in subsequent versions and releases. Despite the limitations identified, the Sun SPOTs have the potential to be used in many contexts. They are wireless, affordable, and simple to use. Moreover, the customization and programming of each Sun SPOT is relatively easy for anyone with basic programming knowledge. Within this open-source development environment, it remains affordable and available to rural and underdeveloped communities.

The focus of this study was exploratory in nature and the potential of Sun SPOT technology has been demonstrated. However, due to the immaturity of the Sun SPOT technology, it is evident that further development is needed in order for such a technology to be commercially used for community activities. Environmental monitoring and improved agricultural production, essential to the sustainability of rural communities, may then be enhanced.

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Teacher's Autonomy Support and ESL Classroom Engagement: The Road Less Traveled

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ABSTRACT

This study investigated the construct of Teacher Autonomy Support Scale (TASS) in the context of ESL classroom in Malaysia and how it influenced student's classroom engagement. The sample comprised 378 students from 14 day schools in a rural area. An empirical study (N=378) was conducted to explore aspects of reliability and validity of the TASS. Confirmatory Factor Analysis via AMOS (7.0) showed evidence of convergent validity of the newly developed scale. A covariance structural analysis shows that teacher's autonomy support is a significant predictor for cognitive and behavioural engagement for students in ESL classroom.

Keywords: Teacher autonomy support- cognitive engagement – behavioural engagement

INTRODUCTION

Understanding of engagement in classroom is essential for teachers to sustain positive learning outcomes from students. Pre-service teachers' who are produced and trained by higher institution need to have an understanding of predictors which will make their students engage in the process of teaching and learning as to become better classroom managers. Trained teachers displayed significantly more autonomy supportive behaviours than did non-trained teachers based on the study done by Reeve, Jang, Carrell & Bach (2004) so these understandings will ensure the sustainability of academic achievement and prevents disengagement that leads to negative learning outcomes. Success in school depends on the extent to which students engage adaptively in classroom learning tasks (Patrick, Ryan & Kaplan ,2007). Classroom engagement is an important factor to predict sustainability of adolescents in schooling process. It is seen as antidote to low achievement, high levels of student's boredom and disaffection (Fredricks, Blemenfled, Friedel & Paris , 2003). Johnson, Kirkpatrick, Crosnoe & Elder (2001) pointed out that few studies have systematically analysed the determinants of different engagement measures especially in developing countries. One way is by providing autonomous motivation where students experience autonomy that makes students take charge of their own learning. The opposite of autonomy support is controlling. The tendency towards a controlling motivating style is an unfortunate state of affairs in light of self-determination theory's research which shows that an autonomy-supportive motivating style is more strongly associated with positive outcomes than controlling style (Ryan & Deci , 2000, 2002)

LITERATURE REVIEW

Autonomy- Supportive Teaching

There are many factors that contribute to students' interest and level of engagement in learning, and teachers have little control over many of those factors (Lumsden, 1994). However, research has shown that teachers can influence student's motivation (Pajares, 1992). Thus, to promote an interest in learning, a valuing of education, and an affirmation of personal capabilities, teachers need to find ways to support students' engagement. Types of autonomy support need to be identified so that teachers know what to say and do to support students' engagement where this can influence students' attitudes

about their capabilities and their interpretation of success and failure that affect their willingness to engage themselves in learning (Anderman & Midgley, 1998). Teachers motivate students using interpersonal styles that range from highly controlling to highly autonomy supportive (Reeve,1998). Self-determination theory identifies that motivating style is partly a matter of personality (Deci,1995; Deci & Ryan, 1991). Deci (1995) reasons that autonomy support is a personal orientation that influences interaction. In the interaction there are skills acquired by teacher to support the autonomy of others such as taking other person's perspectives, acknowledging feelings and making information available for decision making.

Little is known on what kind of motivating styles held by our ESL teachers. A study conducted in Malaysia by Tunku Mohaini and Marohaini Yusoff found that English teachers need to encourage students' participation and the role of teacher was emphasized. Another study was also carried out by Supyan Hussin, Nooreiny Maarof & J.V.D'Cruz (2005) in finding out teacher's attitude towards teaching English Language among 77 teachers in a workshop conducted in Maran District, Pahang. In their observation, it was reported that, teachers tended to ignore the importance of positive self-concept, high self-esteem, positive attitude, clear understanding of the goals for language learning and continuous active participation in the language learning process. Based on these two local studies it has been emphasized that the role of ESL teacher in motivating students is still not satisfactory but did not relate the type of style adopted by English teachers. Almost all previous studies on teachers motivating style were self-reported by teachers but in this study students perceived their English teacher's motivating style. The current research looks at the types of autonomy supportive motivating styles undertaken by Malaysian ESL teachers and how these supports influences students classroom engagement. Teacher autonomy support is examined by identifying the types of support derived from focus group interviews.

Engagement

Engagement according to Newmann's (1992, p. 12) is " . . . the student's psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote." A number of developmental study showed that there is a decline in student's engagement as the students progress through school (Jacobs , 2002; Stipek and Mac Iver, 1989). Therefore, it is a great concern to motivate students' throughout their learning, especially in the classroom context.

In the field of second language motivation, learners motivation to learn can be enhanced by language teachers who can determine every facet of classroom life (Dornyei, 2007 & Ushioda, 2003).Two types of engagement which are essential in classroom settings which are behavioural and cognitive engagement. Factors that indicate behavioural engagement are student's effort, attention, persistence during the initiation and execution of learning activities (Skinner & Belmont, 1993).In school settings, engagement is important because it functions as a behavioural pathway by which students' motivational processes contribute to their subsequent learning and development (Reeve et al.,2004)

DEVELOPMENT OF HYPOTHESES

The purpose of the present investigation was to identify the components of Teacher Autonomy Support and to examine the psychometric properties of TASS and its relation with ESL classroom engagement. It was hypothesized that subscales of TASS and classroom engagement would show convergent validity (H_1). Previous research done by Rosna Awang Hashim et al. (2006) has demonstrated that school engagement comprised behavioural, cognitive and psychological engagement with second order factor. In this study it was hypothesized that classroom engagement could be explained by a second order factor of behavioural engagement (H_2) and cognitive engagement(H_3). Finally it is hypothesized that Teacher Autonomy Support is significantly related to classroom engagement (H_4).

METHOD

This study utilizes focus group interview and a survey method. The survey method involves the gathering of cross-sectional data to investigate the roles of teacher autonomy support and classroom engagement among L2 learners.

Participants

The unit of analysis for this study are adolescents of 16 years old in Perlis, the smallest state in Malaysia. The survey sample consists of 378 students from 14 day schools in this state where samples consist of 52.6 % (N=199) boys and 47.4% (N=179) girls. Initially fifty students took part in five focus group interviews prior to survey data collection.

Procedures

In order to gather initial data because there is little information on types of autonomy support adopted by Malaysian ESL teachers, five focus group interviews were conducted. Fifty students reflecting different abilities of proficiency in English Language took part in the interview. All the five groups consisted of 8-12 students. An interview protocol guided focus group discussions to answer research questions. Data analysis was done based on the transcriptions, where dimensions were identified by extracting the descriptors. Items were constructed and developed accordingly. In designing the instrument, phrases and wordings found in the interview transcripts were retained as much as possible. Pilot testing was done to revise items in order it will be more comprehensible. The newly developed questionnaire was administered during English lessons so that there will be a better perception of their English teachers.

Measures

The questionnaire comprises 42 items, divided into 2 sections. The first section measures teacher autonomy support which is a new instrument and the second section measures classroom engagement.

Teacher Autonomy Support

In order to cover the breadth of the content, and also keep the instrument at a reasonable length, only five items were constructed for each dimension. This was also attempted due to provide a multi-faceted picture of teacher's support in ESL classroom without becoming too narrow or specific by being a single item measured. An autonomy supportive teacher nurture and increase students inner endorsement of their classroom activity (Reeve, 2006) where in this research, for dimensions of teacher autonomy support were derived as , teachers who are responsible in their duty, being friendly, show respect and encourage confidence in their students are dimensions of autonomy supportive teachers. Exploratory and confirmatory factor analyses procedures were used to examine the underlying hypothesized factor structure of TASS. The individual items were used as measured or observed variables to define its respective latent variables.

Classroom Engagement

The second section, classroom engagement comprises cognitive engagement (11 items) and behavioural engagement (10 items) which were adapted from Rosna Awang Hashim et al.(2006) Behavioural engagement scale was used to check students involvement in learning tasks, effort, persistence, attention, class participation and positive conduct. Cognitive engagement subsumes under meta-cognition which is defined as the conscious and periodic self-checking of whether one's goal is achieved and, when necessary, selecting and applying different strategies of planning, monitoring and regulating (Pintrinch & DeGroot. 1990). All items are measured using a five-point rating scale type of response ranging from 1= "almost never" to 5= "usually".

Classroom engagement items are analysed in parcels instead of individually. Use of item parceling in SEM is a common practice (Bandolas, 2002; Bandolas & Finney, 2001) because it results in fewer parameter estimations which can create a more optimal variable to sample size ratio(Bogazzi & Edwards,1998). Therefore, in order to achieve greater stability in parameter estimates, the items for each engagement are bundled into 2 and three item parcels. This results in 9 item parcels or also known as indicators, which are more manageable and thus, reduces problems in convergence when using individual items (Little, Cunningham, Shahar & Widaman, 2002)

RESULTS

Data analyses were designed to answer 4 hypotheses. Descriptive statistics will reveal internal consistency of all the variables while confirmatory factor analysis and a structural model was conducted to test the fitness of data.

Intercorrelations and Reliability

Table 1: Means, Standard Deviations, Internal Consistencies and Intercorrelations, of the variables under investigations.

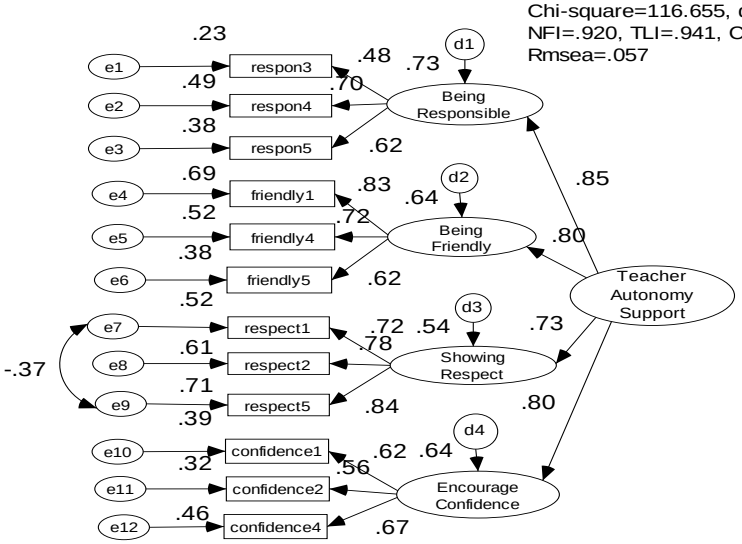
	M	SD	Cronbach's Alpha	1	2	3	4	5	6
1.Being Responsible	3.90	0.64	.64	_					
2.Being Friendly	3.87	0.72	.77	.461**					
3.Showing Respect	4.10	0.80	.82	.552**	.66**				
4.Encourage Confidence	3.69	0.69	.62	.487**	.49**	.54**			
5.Cognitive Engagement	3.35	0.60	.82	.13**	.19**	.29**	.28**		
6.Behavioural Engagement	3.86	0.71	.80	.25**	.28**	.57**	.28**	.57**	_

Table 1 summarizes means, standard deviations, reliabilities and intercorrelations estimates (Cronbach's α values), and intercorrelations. All 4 subscales of TAS showed good levels of internal consistency (i.e., $.64 < \alpha < .80$).

Convergent Validity

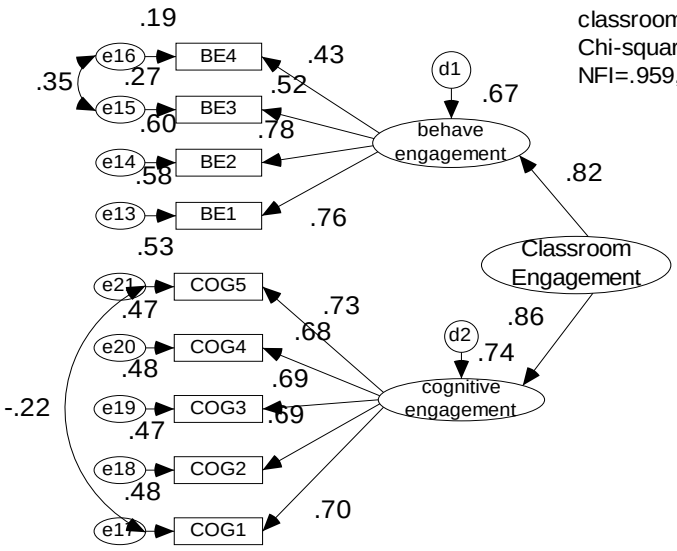
Convergent validity was assessed by examining whether the factor loadings of most indicators related to the same underlying construct are significantly different from zero (Anderson & Gerbing, 1988). Convergent validity is evident when all indicators loaded on one common factor hypothesized earlier. In this study, all indicators for TAS loaded on their corresponding constructs which can be summarized by Figure 1.

Figure 1 : A second order measurement model for Teacher Autonomy Support
Chi-square=116.655, df=52, Ratio=2.243
NFI=.920, TLI=.941, CFI=.953,
Rmsea=.057



Confirmatory factor analysis confirmed evidence of convergent validity of TAS(H_1)
Path coefficients of all the four dimensions ranged from .73 to .85, indicating that they are interrelated and form a latent construct of teacher autonomy support.

Figure 2 :
Results of the measurement model for classroom engagement
Chi-square=46.268, df=24, Ratio=1.928
NFI=.959, CFI=.980, TLI=.970, Rmsea=.050



Inspection of modification indices suggested that we should let errors of e15 and e16 correlate. These two item parcels share similar properties of skipping classes and disruptive behaviours in ESL classroom. E17 and e21 share similar properties on surface strategy in handling English language. The measurement model on classroom engagement revealed that classroom engagement can be explained by behavioural and cognitive engagement. The path coefficients for each engagement in the hierarchical model were .82 and .86. Thus, provide evidence for Hypothesis 2 and Hypothesis 3.

Structural Model

A structural equation analysis was performed through the use of AMOS 7.0(Arbuckle,2007). The standardized estimates are reported for ease in interpreting model parameters. Model fit was established by examining a combination of absolute and incremental fit statistics. Absolute fit statistics used in this study included the traditional chi-square/degree of freedom ratio ($\chi 2/df$), and the root mean square error of approximation (RMSEA: Steiger,1990). Incremental fit statistics were also chosen for their ability to evaluate different aspects of model fit. The three incremental fit statistics chosen were the Normed Fit Index (NFI: Bentler and Bonnett, 1980), Tucker Lewis Index (TLI: Tucker & Lewis,1973) and the Comparative Fit Index (CFI:Bentler, 1989). For the chi-square tests, a significant value relative to the degrees of freedom indicates that the model does adequately fit the data. Thus, a good fitting model is indicated by non-significant results from these tests. However since chi-square is sensitive to sample size we also rely on other goodness of fit indices. The NFI,TLI and CFI vary along a 0 to 1 continuum. Values greater than .90 and .95 reflected an acceptable and excellent fits to the data, respectively. Finally, the RMSEA values at or less than .05 and.08 reflect a close and reasonable fit respectively (Schumacker & Lomax ,1996).

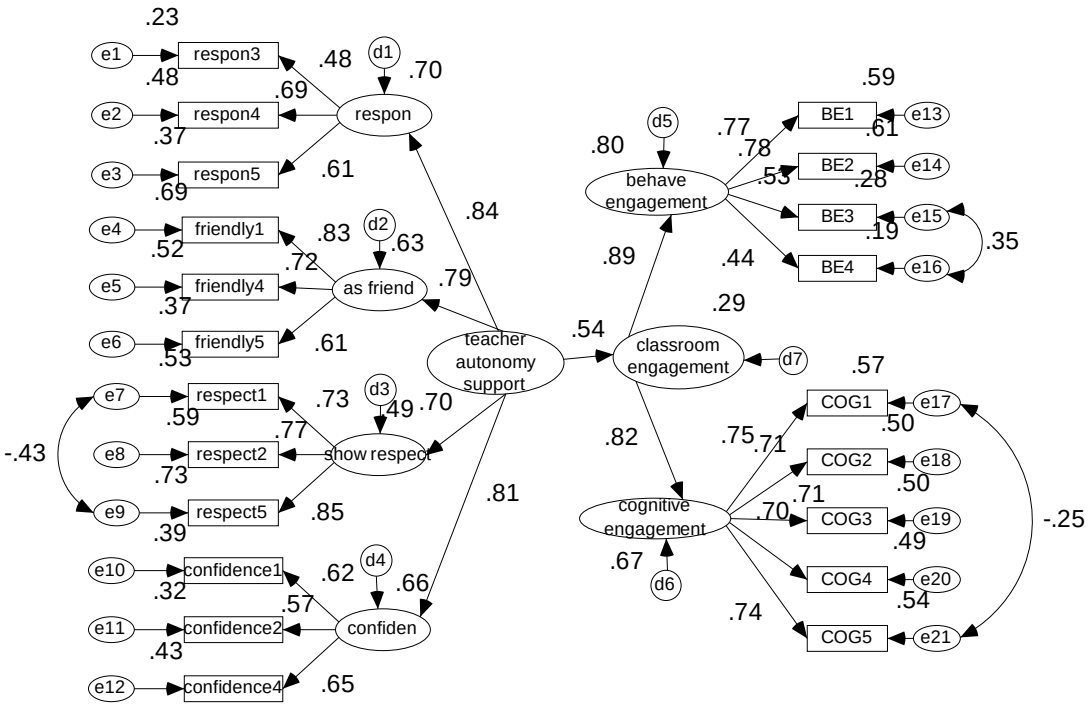


Figure 3 :Results of the hypothesized model
Chi-square=321.115, df=184, Ratio=1.745
NFI=.885, CFI=.947, TLI=.939, Rmsea=.044

The overall $\chi 2$ value was 343.638, with 186 *df*. The chi-square test is sensitive to sample size and its value must be assessed in relation to their degree of freedom, with a $\chi 2 /df \leq 3$ which is generally recognized as good fit of the model to the data where in this study it is 1.848. Root mean square error of approximation (RMSEA) =.047, where according to Browne & Cudeck, (1989) a close fit of the model is at .05 and less. Normed fit index (NFI) =0.876, comparative fit index = .939, Tucker-Lewis Index (TLI)=.931. Values greater than .90 reflected an acceptable fit to the data. Model fit was established by examining a combination of absolute and incremental fit statistics. The results of the structural model showed that the model as a whole explained 29% of the variance in classroom engagement. The explained variance in behavioural engagement and cognitive engagement was 80% and 67% respectively. In Figure 3 teacher's autonomy support (β = .53, t = 6.3, p <.05) has a significant positive direct impact on ESL students' classroom engagement. There were statistically significant path coefficients indicating that teacher's autonomy support comprises of all the four types

of being responsible, being friendly, showing respect and encouraging confidence and directly influence classroom engagement which comprises behavioural and cognitive engagement which provide evidence for Hypothesis 4.

DISCUSSION

The purpose of this study was to develop TASS and examine the latent structure of teacher autonomy support, and assess a model of its relationship with classroom engagement. The TASS questionnaire was developed to measure four dimensions of teacher autonomy support which are being responsible, being friendly, showing respect and to encourage confidence. This study provides evidence of convergent validity of the newly developed TASS. Teacher autonomy support scale in this study is a validated instrument in Malaysian context which can proceed to investigate in greater detail the relationship between teacher autonomy support and other learning outcomes. In this study teacher autonomy support was conceptualized in four dimensions represented by three indicators each. The finding concerning a positive association between autonomy supportive teaching and students engagement is consistent with the results obtained by Reeve et al. (2004). Comparing this research to the one done by Reeve & Jang (2006) where they investigated teacher autonomy support instructional behaviours and identified it with students' perception of autonomy there are some similarity and differences. Showing respect and encouraging confidence is similar with the items of encouraging students' effort and acknowledging students' perspective and experience. The dimension of being responsible and being friendly which means, English teachers' carry out their duties and being approachable by students were newly identified in Malaysian context. Being a country that upholds eastern values of showing high respect to teachers, talking to them as friends is valued as nurturing and facilitating their engagement in ESL classroom. English teachers' carrying out their duties as required without neglecting their responsibility promotes engagement in learning among Malaysian ESL learners behaviourally and cognitively.

In rural Malaysian setting where students lack of resources at home in learning English, school plays a pivotal role in enhancing learning. Engagement in school is an important academic outcome in its own right and it serve as an important social signal whether students were motivated or disaffected over time (Furrer & Skinner, 2003). Autonomy supportive climate provided by teachers is considered as a critical motivational variable that predicted students' intention to persist in high school (Hardre & Reeve, 2003). Learning a second language and to sustain interest in language learning, especially for rural students' where their social environment do not give much support for second language acquisition , depend very much to their language teachers. Finally, teacher autonomy support not only show a direction and change but alleviate the growing problems of disinterested learners in classroom.

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A Study and Development of Temperature and Relative Humidity Control System in Hospital Buildings in Thailand

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ABSTRACT

This research was aimed to control thermal environment (temperature and relative humidity) in air-conditioned rooms in order to reach thermal comfort and good health for the people in hospital. This research was divided into 2 sections: Section 1 studies the direct and indirect influence of relative humidity on the health of people inside hospital buildings and the appropriate relative humidity and temperature to achieve thermal comfort and good health for Thailand by using Delphi technique; Section 2 develops single phase air conditioning system using inverter to control thermal environment (temperature and relative humidity) inside the room to reach the appropriate temperature and relative humidity. The results in Section 1 showed that too high and too low relative humidity had direct and indirect effects on sick building syndrome (SBS), illness, respiratory diseases, growth and distribution of bacteria, virus, and house dust mite. The appropriate temperature and relative humidity for Thailand were 26 degrees Celsius and 50-60%, respectively. The results in Section 2 showed that the developed system could control temperature and relative humidity at the desired level with the changes in temperature and relative humidity in the range of $\pm$0.35 degrees Celsius and 50-60%, respectively. The development of industrial technology for single phase air-conditioner which can control temperature and relative humidity at a steady level using inverter will lead to good quality of life for the people in hospital in a sustainable manner.

Keyword: Temperature and Humidity Control; Inverter; Delphi technique; Healthy; Thermal comfort.

INTRODUCTION

Thermal comfort is a reaction which humans can feel concerning heat and cold (D Holm 2005). A room with thermal comfort means a room where 80% of all persons inside could accept the environment (ANSI/ASHRAE Standard 62-2001). Thermal environment affects human comfort due to location and weather (Ruey-Lung Hwanga 2007). The design of buildings and offices must depend on human comfort (M. Kavgic 2008), especially in hospital buildings where there are patients, staff members and other relevant persons under the risk of infection through germs, bacteria, virus and the like. The control of appropriate thermal environment, therefore, is important for thermal comfort and good health for the persons in hospital (Ruey-Lung Hwanga 2007).

The general public understood that good control of thermal environment was only to control temperature inside the room but there were still a lot of people inside such environment suffering from nose irritations, stuffed nose, rainy nose, eye irritations, cough, tightness in the chest, fatigue, headache and skin irritations. Such symptoms are called sick building syndrome (SBS) which is affected by relative humidity inside the room (Arundel, A.V 1986) because humidity affects the rate of water evaporation in the air and the balance of energy inside the body and thermal comfort of human beings (L. Harriman 2001).

Medical studies from foreign countries have shown that it is important to control humidity in hospital buildings and the law is enacted. In Thailand, however, there has been no such action and the research on the influence of relative humidity on thermal comfort and good health of human beings is scarce. At present, air-conditioning systems used in most houses and offices is split type air-conditioner which cannot control temperature and relative humidity at a stable level. Inverter air-conditioners can only control temperature at a stable level; it cannot control relative humidity at a stable level. Therefore, a device to increase or reduce humidity is needed and costs a lot of money. Moreover, it cannot control relative humidity at a stable level in the desired range. Therefore, the researchers decided to study the direct and indirect effects of relative humidity on the health of the persons in hospital buildings in Thailand. The results would be used to design and develop a single phase air-conditioning system which could control both temperature and relative humidity at a stable level in a short time with the temperature changes in the range of $\pm$ 0.5 degree Celsius and relative humidity changes in the range of 50-60%. There would be genius control system for air-conditioners using an inverter to control the growth, distribution and existence of germs, bacteria, virus, house dust mite and fungi. This would bring sustainable good health and thermal comfort for the persons in hospital buildings.

Influence of Humidity on Thermal Comfort and Good Health of Human

Case studies and research on epidemiology suggest that relative humidity has a direct effect on cell membranes which is related to respiration, contraction, nose tissue inflammations or influenza and fever. It also has an indirect effect on the growth of allergies and respiratory diseases along with the existence of diseases like fungi (e.g., *Aspergillusfumigatus)*, protozoa, house dust mite, bacteria (e.g., *Streptococcus, Legionella)* and virus (e.g., common cold, flu) (Baughman_ Edward A 1996) (as shown in Figure 1). Relative humidity also affects the intensity of chemical pollution in the air by changing the distribution rate of gas from the materials used inside the buildings and the reaction between water and chemicals in the air (Arundel, A.V 1986).

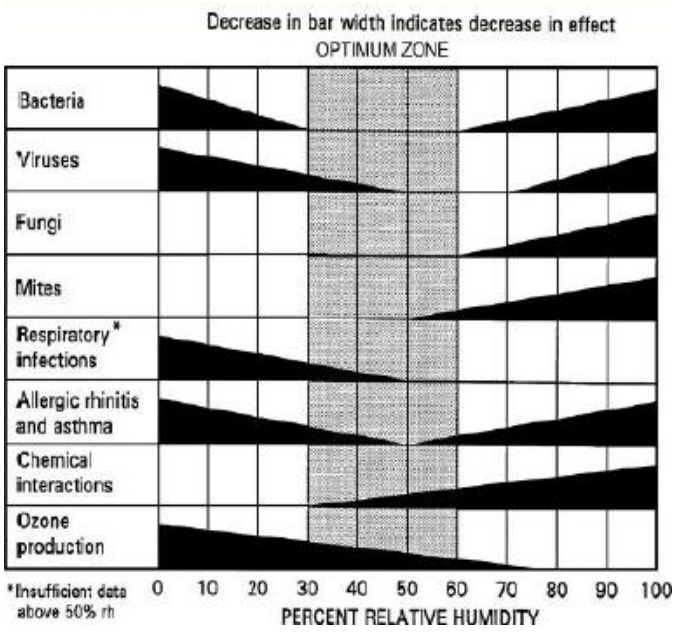

Figure 1: Optimum relative humidity range for minimizing adverse health effects.

Relative humidity has a direct effect on cell membranes which is related to respiration, contraction, nose tissue inflammations or influenza and fever. Recent studies have shown that the increase in humidity can reduce the nose tissue inflammations. It was found that the increase in humidity can reduce the nose irritations of 4 people out of 22 people in the sampling group (Hashiguchi, N 2007).

As for 22 participants in the test, relative humidity might have an effect on nasal mucus in the respiratory canal. Stuffed nose can cause respiratory problems in the mouth. A study in the effect of relative humidity on the viscidity of the nasal mucus has shown that the viscidity reduces doubly when the relative humidity is 100% or 60%. The vapours from the increase in humidity-both accidentally and willingly-might be useful because the vapours can reduce the viscidity of the nasal mucus and reduce the growing rate of germs in respiratory system, cough and nose tissue irritations in children with respiratory problems (Arundel, A.V 1986).

Hemmers et al. reported that an environment with relative humidity lower than 50% will increase the spreading rate of influenza virus. Low humidity is also related to a tissue weakness (Hemmers, J.H. 1960). Hiraga installed an ultrasonic device to increase the humidity in 222 houses. The results were that an appropriate increase in humidity is useful to reduce various diseases and respiratory diseases (Hiraga, Y1981). Tsutsumi et al. tested the effect of low humidity on comfort and other results in participants under stable circumstances in summer (Tsutsumi H 2002). Ibamoto et al. reported that low humidity was possible for thermal comfort in both transient and steady state (Ibamoto .T 2001).

Air-Conditioning System

The design and installation of air-conditioning systems to control thermal environment to achieve thermal comfort inside hospital buildings should comply with the ASHRAE Standard 55 which is the most appropriate (ASHRAE Standard 55-2004). Comfortable thermal environment in hospital can make the patients and staff members feel good and better (Ruey-Lung Hwanga 2007). The control of relative humidity as in ASHRAE 2001 (item 8.12) reads that relative humidity to achieve thermal comfort should not exceed 60% (ASHRAE Handbook: Fundamentals 2001).

Most buildings were installed with air-conditioning systems to build up good environment for the persons inside. There were two control systems according to the factors: System 1 controlled only comfortable air conditioning; System 2 controlled both relative humidity and precision air conditioning (Long Enshen 2005). Both systems were intended differently in that air-conditioners with System 1 were used to create good environment by controlling only temperature. They could be an inverter or normal device. Air-conditioners with System 2 were used to maintain the stability of electronics and computer only. They were not intended for household because they cost 5 times more. The smallest size was 48,000 BTU. They occupied more area than System 1 and they could not control the speed of the compressor motor. They also wasted electricity power since it added vapours inside the room.

RESEARCH METHODOLOGY

This research was divided into two sections: Section 1 studies the direct and indirect influence of relative humidity on the health of people inside hospital buildings and the appropriate relative humidity and temperature to achieve thermal comfort and good health for Thailand by using Delphi technique; Section 2 develops single phase air conditioning systems using inverter to control thermal environment (temperature and relative humidity) inside the room to reach the appropriate temperature and relative humidity with precision.

Section 1: The Delphi technique

The Delphi technique used in this study was to brainstorm the ideas from the experts in 3 following topics:

1. The influence of humidity on the growth of diseases of people living in air-conditioned rooms in both direct and indirect ways such as influenza, respiratory diseases, asthma, tuberculosis, eye irritations and allergies.
2. The relationship between relative humidity and the growth as well as the distribution of bacteria, virus, fungi and other pathogens which affect the health of human beings in both direct and indirect ways.
3. Optimal relative humidity and temperature to give thermal comfort and good health of human beings in Thailand

Procedure was as follows:

1. A group of 11 experts was chosen using purposive sampling method from the Faculty of Medicine and the Faculty of Tropical Science, Mahidol University.
2. The tools to collect the data from the experts were developed for 3 times. They were an interview form and a questionnaire.
3. The data was analysed in a statistical manner to find out the consistency and the probability in 5 scales for the questions

Section 2: Temperature and Relative Humidity Control System

Details and how the system works

The main components of temperature and relative humidity control system by split type inverter air-conditioning system with inverter installed to control the speed of compressor motor (1 phase type), ultrasonic humidifier, electric heater and control unit (as shown in Figure 2).

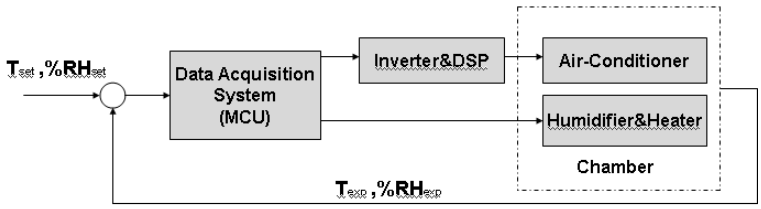

Figure 2: System control algorithm block diagram

The system works as follows: Data acquisition system (MCU) detects the temperature and relative humidity in the test room ($T_{exp,}\%RH_{exp}$) and compare them with the default or set value ($T_{set,}\%RH_{set}$). If the temperature is higher than the set value, MCU will send the data to DSP (Digital Signal Processing) to increase the speed of compressor motor to increase the flow rate of refrigerant . When the temperature becomes as set, the speed of the compressor motor will be decreased as appropriate which is decided by fuzzy logic program. In case that relative humidity is lower than the set value, MCU will tell ultrasonic humidifier to increase the amount of vapour in the test room. If the relative humidity is higher than the set value, the humidity in the room must be decreased. In this case where the humidity is reduced, the temperature in the room will become lower as well. MCU will tell electric heater to increase the temperature in the room. Therefore, such system can control the temperature and relative humidity in the desired range as always.

Experiment and Materials

In this experiment, the room was the bedroom of 20 square meters with single phase split type air-conditioner (18000 BTU), ultrasonic humidifier (200 millilitres per hour), electric heater (2 kilowatts) and inverter to control the speed of compressor (Figure 3). The temperature and relative humidity are detected by STH15. The data were recorded by Hioki datalogger at every 5 second for 8 hours from 10 pm to 6 am. The experiment was divided into 2 cases: Case 1 (Figure 3) used inverter to control the speed of compressor motor of air-conditioner and it had ultrasonic humidifier along with electric heater to control both temperature and relative humidity. The temperature and relative humidity were set at 28.5 degrees Celsius and 50-60% respectively. Case 2 (Figure 4) used thermostat to control compressor of the air-conditioner without relative humidity control system. The temperature was set at 26 degrees Celsius. The data concerning temperature and relative humidity in the room was recorded as done in Case 1. During the experiment, the data concerning temperature and relative humidity outside the room was also recorded from 6 am every 2 minutes for 24 hours. There were 703 records (Figure 5). After considering temperature and relative humidity in Figure 5, we found that during night time relative humidity reached 80% whereas during day time relative humidity was about 45% which was quite low. This indicated that Thailand has high relative humidity.

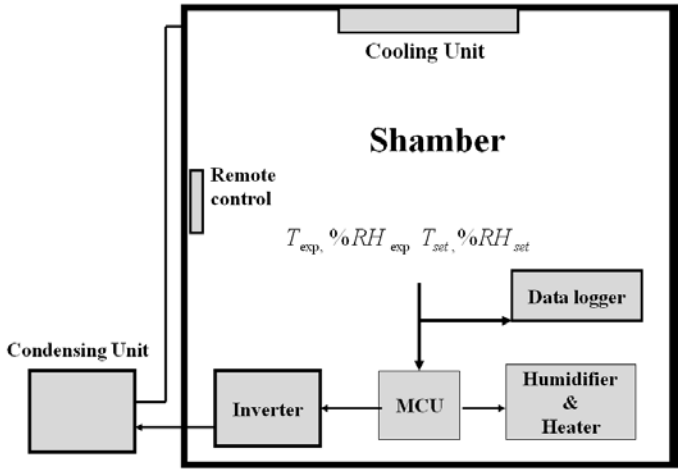

Figure 3: Schematic diagram of the experimental setup : case 1

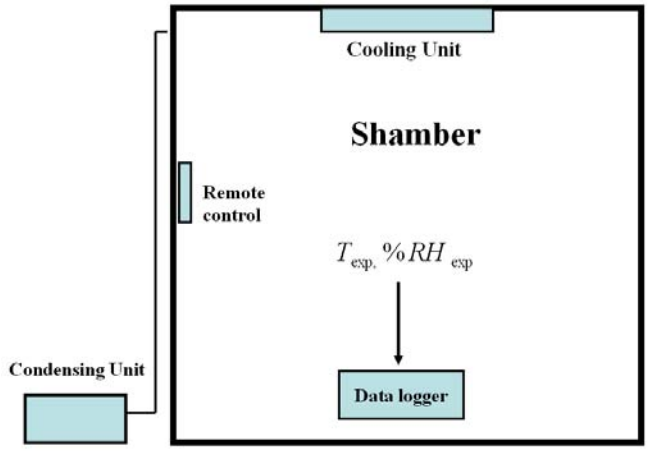

Figure 4: Schematic diagram of the experimental setup:case 2

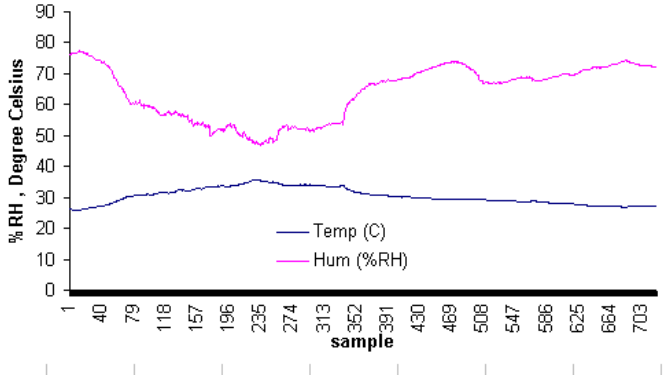

Figure 5: Temperature and Relative Humidity outside the Room for 24 Hours

RESULTS AND DISCUSSION

Delphi Technique

As for the study of relative humidity which affect the health of people living in the hospital buildings in Thailand, the questions which the experts agreed with and showed the probability at the most level were as follows: 1) Thailand is tropical; therefore, there are diversity in tropical medicine; 2) Humidity in the air influences the growth of bacteria, virus, house dust mite and fungi; 3) Relative humidity has an indirect influence on diseases, rhinitis and allergies; 4) The value of relative humidity and temperature in the range of comfort zone by ASHRAE can be applied in Thailand; 5) The influence of relative humidity on bacteria, virus, fungi and house dust mite, according to ASHRAE, can be applied in Thailand; 6) The control in relative humidity in the range of comfort zone will give good results to the health and the comfort of people living in air-conditioned rooms; 7) Rooms whose relative humidity and temperature are controlled are to keep the sustainability of the medical devices and equipment only; 8) Air-conditioned rooms which can precisely control the temperature and relative humidity will give better results to the health and comfort than traditional air-conditioned rooms. All questions had the same value for the median, that is 5.

Temperature and Relative Humidity Control System

Results from the experiment on working with temperature and relative humidity control by inverter air-conditioner (Case 1) and normal air-conditioning system without inverter and humidifier (Case 2) in the same environment for 8 hours were as follow: In Case 1, there were 5670 records of temperature and relative humidity data (Fig.6).

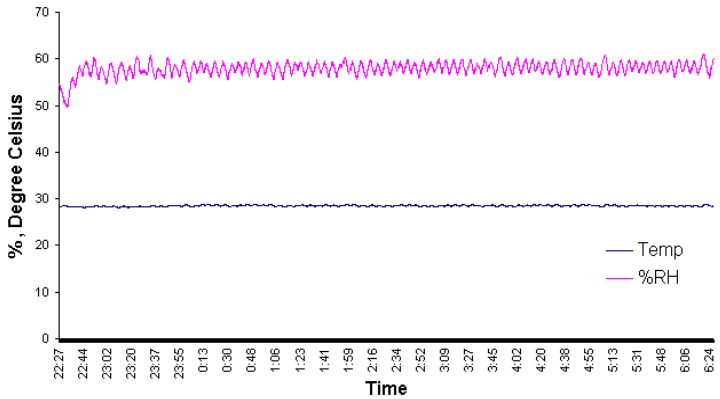

Figure 6: Results from Case 1

It was found that the highest temperature was 28.8 degrees Celsius. The lowest one was 28.1 degrees Celsius. The highest relative humidity was 59.8% and the lowest one was 50%. The results from Case 2 were as follows:

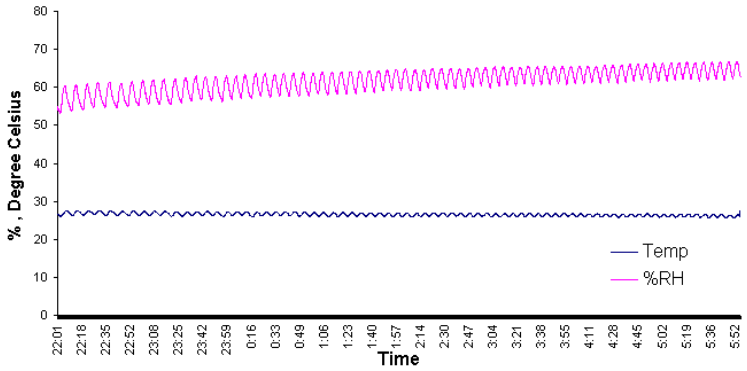

Figure 7: Results from Case 2

There were 5706 records of temperature and relative humidity (figure 7). It was found that the highest temperature was 27.6 degrees Celsius and the lowest one was 25.6 degrees Celsius. The highest relative humidity was 66.8% and the lowest one was 53.2%.

According to the results of 2 experiments, it was found that in case of temperature and relative humidity control, the changes were in the range of ±0.35 degree Celsius and the relative humidity was between 50-60% as a desired condition. As for Case 2, there was only temperature control and no relative humidity control. It was found that the changes in temperature were higher than set around 1.6 degree Celsius and the relative humidity was quite high or 50-60%. According to Figure 7, it could be found that as time passed, the relative humidity inside the room became higher and higher although water got condense all the time. This was because relative humidity from outside could get inside the room. During night time, high relative humidity caused air-conditioner to use more energy to drive out a large amount of water. According to both cases, Case 1 could control environment as a desired condition.

Due to the fact that this experiment was done inside the bedroom where there could be changes in heat all the time through heaters inside the room, human activities along with opening-closing door, there were changes in heat and humidity all the time. Relative humidity outside the room was another factor which was essential for the experiment because there was a leak in the room, allowing relative humidity outside the room to get inside. The relative humidity inside the room was higher then. Therefore, Case 2 in which there was no relative humidity control showed higher changes in temperature and relative humidity than Case 1.

CONCLUSIONS

Delphi technique results showed that the experts agreed on the fact that relative humidity affects thermal comfort and health of human beings. Therefore, in air-conditioned rooms, there should be temperature and relative humidity control system to achieve thermal comfort and good health for the persons inside the room, especially in hospital buildings because it is good for patients and staff members.

Temperature and relative humidity control system using inverter air-conditioning system in this research could control temperature and relative humidity in the room as a desired condition. The changes were different from the set value around ±0.35 degrees Celsius and it could control relative

humidity between 50-60% which was the appropriate range for Thai climate. If the system is used in the buildings which need to control thermal environment such as hospitals, patient's rooms, houses or offices, there will be thermal comfort and good health for the people living inside.

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Cross-Cultural Perspectives of Knowledge Sharing for Different Virtual Classroom Environments: A Case Study of Thai Students in Thai and Australian Universities

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ABSTRACT

Collaborative learning has been accepted as an effective learning style that can enhance students' and instructors' ability to create knowledge and develop understanding. To enhance an effective collaboration learning environment needs the sharing of similar knowledge, background and experience through information communication technologies (ICT). There are a number of ways in which culture influences the use of these information technologies. The cultural characteristics, which can be viewed as the influencing factors on knowledge sharing in a virtual classroom, are power distance, uncertainty avoidance, individualism and collectivism.

The main purpose of this study was to investigate how the differences in cultural values affect the way Thai students in both Thailand and Australia access and share knowledge in a virtual classroom. According to Hofstede, the national culture between Thais and Australians are different in the degree of power distance, uncertainty avoidance and individualism/collectivism. Thais are likely to have high power distance, high uncertainty avoidance and collectivism while Australians have low power distance, low uncertainty avoidance and individualism.

A qualitative method using t-test and Multiple Regression analysis was chosen to test the research hypotheses that Thai students in Thai universities have greater difficulty in knowledge sharing than Thai students in Australian universities.

A questionnaire survey designed to identify cultural differences was administrated to 100 students in Thai universities and 100 students in Australian universities who used ICT for sharing knowledge in their virtual classroom. The findings of the study and recommendations will be outlined. The research outcome of the study can assist project managers in implementing effective open-wide knowledge exchange systems.

INTRODUCTION

In recent years, advances in multimedia computing network and Internet techniques have brought about an education revolution, i.e. global teaching and learning, which means that teachers and students can conduct their teaching/learning activities anytime and anywhere so long as they have computers connected to the Internet. To enable global teaching and learning, a networked computer based education system has been proposed and is under development.

The virtual classroom is a system to support preparation and authoring of teaching materials, to effectively organize teaching activities, and to ease students learning activities. Although the virtual classroom is positioned as a key source of effective learning, there is a question which has kept educational and psychology theorists pondering for decades. The question is 'Are some characteristics of culture and negative perceived value of computer-based information critical barriers to knowledge sharing behavior in a virtual classroom environment?'

The cultural characteristics, which can be viewed as the influencing factors on knowledge sharing behavior in a virtual classroom include power distance, uncertainty avoidance, individualism/ collectivism. These three dimensions of cultural variability emerged from Hofstede(1991,2001) in his study of 50 organizational life spanning countries and are defined in Table 1. Burn and Thongprasert (2005) investigated how these characteristics influence the quality and productivity of Thai students' online learning. The research found that high power distance and high uncertainty avoidance were significant obstacles while collectivism was a facilitator. According to Hofstede (2001), Thais and Australians are different in the degree of power distance, uncertainty avoidance and individualism/collectivism. Thais are likely to have high power distance, high uncertainty avoidance and collectivism while Australians have low power distance, low uncertainty avoidance and individualism.

Variable	**Opposite**	**Meaning**
Power Distance	N/A	A measure of the interpersonal power in society as perceived by the less powerful.
Uncertainty avoidance	N/A	A measure of uncertainty about the future that is perceived as threatening.
Collectivism	Individualism	A measure of the relationship between the individual and the collectivity.

Table 1: Meaning of Hofstede's cultural variables

Although the use of information communication technologies (ICT) within a virtual classroom is accepted to be the facilitator in knowledge sharing the success of using this medium is still ambiguous. Recent research indicates that knowledge sharing is profoundly influenced by cultural values of students. (Hambrick, Davison et al. 1998); (Pfeffer and Sutton 2000); (Hofstede 2001); (Hutchings and Michailova 2004). The cultural characteristics, power distance, uncertainty avoidance and collectivism, can be viewed as the critical influencing factors on knowledge sharing behavior in a virtual classroom. In this study we compare Thai students studying international programs in Thailand and in Australia to identify any differences between the cultural characteristics and the influence these characteristics have on the perceived knowledge sharing in a virtual classroom environment. The main emphasis of this study is to investigate how the Thais can adapt to a new culture to facilitate their knowledge sharing through synchronous and asynchronous communication technologies. Therefore the study findings will be of special interest to project managers in implementing open-wide knowledge exchange systems and successful virtual classroom.

RESEARCH OVERVIEW

This study focuses on the characteristics of power distance, uncertainty avoidance and individualism/collectivism which may facilitate knowledge sharing behavior in a virtual classroom for Thai students in Thailand and Australia. According to Hofstede, Thais are likely to have high power distance, high uncertainty avoidance and higher levels of collectivism compared to Australian students. (Hofstede, 1991; Thanasankit, 1999) The research objective is to find out the possible

cultural values that might affect knowledge sharing behavior in a virtual classroom for Thai students who study international degree programs in Thai and Australia universities.

Research Questions

1. Is there a different attitude towards knowledge sharing for Thai students in Thai and Australian universities?

2. Do the cultural values associated with power distance, uncertainty avoidance and collectivism significantly influence knowledge sharing behaviour?

3. How do differences in cultural values affect the way Thai students in both countries access and share knowledge?

Research Methods

The study utilised a quantitative methodology. Following a review of the influence of culture in knowledge sharing, an exploratory study was conducted through a closed-end questionnaire survey. Two objectives were determined from the conceptual framework. Firstly, to explore whether there is a different knowledge sharing behaviour between Thai students in Thai universities and Australia universities. Secondly, to test whether the three dimensions of culture power distance; uncertainty avoidance and collectivism/individualism in each country affect knowledge sharing behaviour through participation tools in a virtual classroom environment.

Sample and data collection

The questionnaire consisted of questions that assess the three cultural dimensions (power distance, uncertainty avoidance and individualism/collectivism) and six demographic questions (sex, age category, university/faculty, years of study, and time to live in the country where they were studying). The questionnaire and consent letter were posted online and administrated to both respondent groups by email. The sample consisted of 100 Thai students who were studying an international program in a Thai university and 100 Thai students who were studying in Australian university. There were respectively 85 and 70 questionnaires completed providing a response rate of 77.5 %.

Measures

In this study, the questionnaire items were mainly adapted from previous studies and modified for use in the knowledge sharing context focusing on three independent and one dependent variable. The three independent variables were cultural dimensions; power distance, uncertainty avoidance and individualism/collectivism. The dependent variable was the degree of knowledge sharing behaviour as measured by attitudes of respondents. All variables were measured using 30 items and all items were measured using a five-point Likert-type scale (ranging from 1= strongly disagree to 5 = strongly agree)

RESEARCH OUTCOMES

To strengthen the quality of the research design, internal reliability was evaluated by assessing the internal consistency of 30 items representing each factor using Cronbach alpha statistic. The reliability coefficient of the 30-item instrument was 0.81, exceeding the minimum standard of 0.70 suggested for basic research (Cavana et al., 2001). Construct validity was obtained through a thorough grounding of all questionnaire items within the existing literature (Creswell, 1994). Tolerance and variance inflation factor: VIF) was used to test discriminate validity.

Variable	Collinearity Statistics	
	Tolerance	VIF
Power distance	.896	1.117
Uncertainty avoidance	.782	1.279
Collectivism	.866	1.154

Collinearity Diagnostics

Table 2: Discriminate validity

The data in Table 2 showed low multi-collinearity (Tolerance > 0.2, VIF < 10). This implied that all variables are distinctly different concepts and not correlated to each other (Field, 2000)

The participants' background is provided in Table 3. Participants were selected from 2 universities in Thailand which offer international programs and 3 universities in Australia.

Gender

Male	40.0%
Female	60.0%

Age

< 18 years	-
18 – 24 years	89.00%
25– 34 years	11.00%
35– 44 years	-
>44 years	-

Faculty

Engineering	33.5%
Business Administration	41.9%
Social Science	3.9%
Science	9.7%
Information Technology	9.7%

Education level

Postgraduate	Undergraduate	
6.5%	93.5%	
	First year	14.2%
	Second year	61.9%
	Third year	11.6%
	Fourth year	5.8%

No of years living in country

	Thailand	**Australia**
1-2 years	-	71.4%
3-5 years	-	17.2%
6-10years	-	10.0%
>10 years	100%	1.4%

Location

Thai university	54.8%
Australian university	45.2%

Table 3: Characteristics of student participants (n=155)

Results

A *t*-test of the mean scores for each variable was used to indicate if the knowledge sharing behaviour is significantly different between Thai students in Thai universities and Australian universities. The results of the *t*-test are shown in Figure 4.

* $p < 0.05$

	Thai university (n=85)		**Australian university (n=70)**		***t***	***p***	**Mean Difference**
	Mean	**S**	**Mean**	**S**			
Knowledge sharing	**3.25**		**3.74**	**.57**			
Power distance	**2.97**	**.59**	**2.39**	**.44**	**-5.15**	**.00***	**-.48**
Uncertainty avoidance	**3.00**	**.37**	**2.86**	**.41**			
Collectivism	**3.22**	**.37**	**3.18**	**.28**	**8.66**	**.00***	**.57**
		.32			**2.24**	**.02***	**.14**
					0.87	**.38**	**.04**

Table 4: Descriptive statistics and result of t-test in knowledge sharing behaviour and cultural factors between students in Thai universities and Australian universities.

The data in table 4 indicated that knowledge sharing behavior of Thai students studying in Thai universities is lower than Thai students studying in Australia universities (3.25 and 3.74 respectively). The *t*-test confirms that the mean difference of -.48 is significant at the 95% confidence level.

The mean of power distance and uncertainty avoidance of Thai students in Thai universities are higher than for Thai students in Australian universities indicating that there is a higher power distance and uncertainty avoidance among Thai students in the Thai universities than Australian universities. The *t*-test confirms a significant difference in the mean scores at the 95% confidence level.

Finally, the means of both groups are almost equal in collectivism and the result of *t*-test shows that there is no significant difference between those who study in Thai universities and Australian universities.

A comparison of students from the Science/Technology and the Business/Social Science disciplines showed that there was no significant difference in knowledge sharing, power distance, uncertainty avoidance and collectivism for students studying in Thailand. For students studying in Australia there was also no significant difference in knowledge sharing, power distance and collectivism but it was found that there was a significant difference in uncertainty avoidance with mean score of 3.00 for Science/Technology compared to 2.74 for Business/Social Science.

Non parametric testing was also undertaken using the modes for each category. The same outcomes where confirmed except for the uncertainty avoidance which was found not to significantly different.

Cultural values that influence knowledge sharing

Three cultural factors were tested if they affected the way students in both countries accessed and shared knowledge. Multiple regression analysis was used to test the relationship between dependent and independent variables. The dependent variable was students attitudes towards knowledge sharing and the independent variables were power distance, uncertainty avoidance, and collectivism. The analysis was divided into two sample groups, the first group was Thai students studying in Thai universities (n= 85) and the second group was Thai students studying in Australian universities (n=70). It is reasonable that any cultural values that might affect knowledge sharing behavior in each group depend on their virtual classroom environments. The results are shown Figure 1.

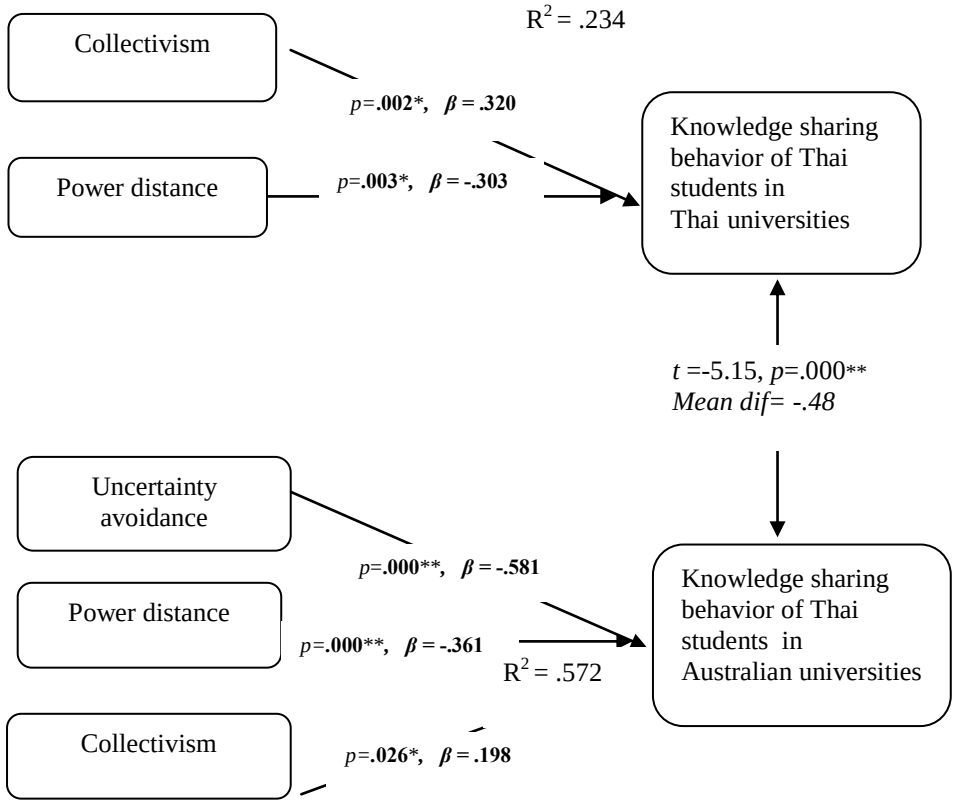

Figure 1: Results of Regression Analysis – Knowledge sharing behavior

Multiple regression analysis was undertaken to identify a relationship between the variables.

Thai universities

It can be observed that 23.4 % of the variance in knowledge sharing behavior of Thai students in Thai universities is explained by two independent variables; power distance; and collectivism.

For these two cultural factors, the highest beta (β) value is .320 for the collectivism, which is significantly at the 95% confidence level (p=.002). The positive beta weight indicates that if knowledge sharing behavior is to be enhanced, increasing the collectivism of Thai students is necessary.

The second important variable is the power distance with a beta (β) value of -.303, which is significantly at the 95% confidence level. The negative beta of power distance indicates that if greater knowledge sharing behavior is needed, reducing the power distance of Thai students is necessary.

Australian universities

The output in figure 1 indicates that three independent variables provided the best regression model. In this case 57.2 % of the variance in knowledge sharing behavior of Thai students in Australian universities is explained by three independent variables; power distance; uncertainty avoidance and collectivism.

Examining the independent variables, the uncertainty avoidance is the most important in explaining the variance in knowledge sharing behavior with a beta (β) value of -.581 , which is significantly at the 95% significance level (p=.000) The negative beta weight indicates that if knowledge sharing behavior is to be increased, reducing the uncertainty avoidance of Thai students is necessary.

The second important variable is the power distance with a beta (β) value of -.361, which is significantly at the .001 level. The negative beta of power distance indicates that if knowledge sharing behavior is to be increased, reducing the power distance of Thai students is necessary.
Finally, the positive beta weight of collectivism is .198 which is significantly at the 95% confidence level indicating that student working in group-based orientation can enhance students' access and knowledge sharing in their virtual class.

Factors that influence knowledge sharing

Power distance

The results from this study show that power distance significantly impedes knowledge sharing behavior of Thai students both in Thai universities and Australian universities. This mode of evaluation suggests that lower power distance could enhance knowledge sharing of Thai students. This finding is confirmed by many researches (Rohitratana, 1998; Dimmock, 1998;Thanasankit, T, 1999; Hofstede, 2001) According to the data, students are more likely to respect the direction and control of instructors and therefore, it is not surprising that a teacher-centred approach is found to be more acceptable as the preferred learning style among Thai students. (Mckena, 1995; Triandis 1996; Bhagat et.al, 2002). The research finding shows that the power distance is strong for Thais studying in Australia where the cultural aspects are different. However, the degree of power distance of Thai students in Thai universities is greater than those who are studying in Australian universities and this might result in a different knowledge sharing behavior.

Uncertainty avoidance

The results show that the uncertainty avoidance significantly impedes knowledge sharing behavior of Thai students in Australian universities. This implies that Thai students in Australian universities, where the uncertainty avoidance for Australian students is assumed to be low, did not adapt to the local environment due to cultural differences. Thai students are reluctant to cause any discomfort and tend to worry about losing face so they prefer informal communication channels. The finding is similar to Bhagat et al.'s study of Chinese students. Similar to Thai students Chinese students rely more on the communication media with high media-richness such as face-to-face or phone calls rather than used low media-richness such as e-mails or online discussion boards (Bhagat, 2002). Thai students are more likely to shy away from contributing to online community discussions because of worries about face, modesty, and the lack of language proficiency which are major barriers to knowledge sharing. It should be noted that most of the students have spent only 1-2 years studying in Australian university and have not yet adapted to the Australian culture.

Collectivism/Individualism

The positive beta weights for collectivism in both groups were high and were significant at the 95% confidence level. This suggests that Thai students in Thai universities and Australian universities were not different in relation to collectivism. The literature suggests that Australians are characterized as individualists (Hofstede, 1991). However, this study and other research shows that Thai students in Australia prefer to continue to work in groups rather than as individuals. (Traindis, 1995 ; Burn and Thongprasert , 2005) They were more likely to maintain relationships among friends and avoided disagreement with others.

Many researchers have stated that collectivist cultures, where members tend to have a strong sense of in-group members and distrust of out-group members, could be a barrier to knowledge sharing (Chow, 2000). However, it seems that, instead of being a barrier, the research indicates that the collectivist culture could facilitate knowledge sharing. This supports the view that strategies for knowledge sharing in the virtual class should be developed following a cultural needs assessment.

CONCLUSION

The study suggests that methods of knowledge sharing, communication and learning in the virtual classroom are profoundly influenced by cultural values of students. Power distance is the first cultural aspect that significantly inhibits knowledge sharing in Thai universities and Australian universities. In the students' view the attitudes to hierarchy and rank could impact their intention to communicate and share what they know online. Students expect that their lecturers are higher in status and qualification so they should be expert and know everything. Not surprisingly, they are more likely to accept teacher-centre as their learning styles and are not comfortable to ask question or present their ideas.
The second cultural value is uncertainty avoidance which was found to be a significant impediment of students' knowledge sharing in Australian universities. This indicates that Thai students in Australia are less hesitant to post a comment or an answer to someone else's question on the discussion board.
Finally, the research found that collectivist culture could promote Thai students to share their knowledge through online communication both in Thai universities and Australian universities. This seems to be a strong cultural value that shapes students' knowledge sharing patterns. Although knowledge sharing of Thais studying in Australian universities is influenced by power distance and uncertainty avoidance, their attitude to participate in knowledge sharing through online communication tools is greater than Thais studying in Thai universities. This warrants further investigation.

The results suggest that knowledge sharing strategies in the online environment for Thai students in Thai and Australian universities should be tailored to values and cultural preference of students in each country. Some suggestions are stated below:

1) The coping strategies that can be used to overcome the problems is to motivate and encourage students to use collaborative ICT tools such as e-mail, discussion boards to enhance knowledge sharing and integrating the use of ICT in day-to-day work.
2) Thai students are more likely to learn by group-based orientation. Therefore, any assignments should be designed in group- working rather than individual-working.
3) Websites, online community or web pages should be designed based on a cultural needs assessment, and identification of culture-specific barriers to knowledge exchange.
4) Conducting training on acceptable online communication and flexible rules for posting questions and sharing knowledge or ideas should be adjusted to meet the local environment.

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Mutual Adaptation of International Students and Academics for the Sustainable Development of International Education

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ABSTRACT

This paper reports the findings of a qualitative study that explores how international students from China and Vietnam in different disciplines in Australian higher education interpret and adapt to disciplinary requirements and how academics respond to the diverse needs of international students. The study employed a trans-disciplinary framework for interpreting students' and lecturers' practices within institutional structures. This framework has been developed by infusing a modified version of Lillis' (2001) heuristic for exploring students' meaning making with positioning theory (Harré & van Langenhove, 1999). A prominent finding of the study indicates the emergence of three main forms of adaptation, committed adaptation, face-value adaptation and hybrid adaptation (my prosed terms), that the students employed to gain access to their disciplinary practices. The findings of the study give insights into ways that a dialogical pedagogic model for mutual adaptation can be developed between international students and academics. The aim is to enhance the education of international students in this increasingly globalized environment. The model offers concrete steps towards developing reciprocal adaptation of international students and staff and implementing cultural diversity practices within the overarching institutional realities of the university.

Keywords: international students, academic requirements, adaptation

INTRODUCTION

Australia is one of the three leading countries in terms of exporting education services internationally. The number of international student enrolments in Australian education in 2007 was 455,185, which represented around 25% of the total student population (Australian Education International, 2008). Education is a fast-growing economic business for Australia which has overtaken tourism and is currently Australia's largest services export and the country's third top export overall, only behind coal and iron ore. Spending by international students contributed around AUS12.5 billion to the national economy in 2007. Within the competitive environment of the current education export market, a number of strategic policies and considerable marketing efforts have been focusing on increasing the proportion of international students in Australian universities. Consequently, exploring ways to effectively respond to the academic, social and financial needs of international students from a diverse range of countries has become a growing focus for Australian higher education. This is particularly important due to the increasing dependence of Australian tertiary institutions on international students' tuition fees, which is largely driven by the decrease in direct funding from the Commonwealth Government. This is more critical given the fact that potential international students have an increasing number of options for their higher education destinations. Apart from the options of study in other English-speaking countries, the major threats to the current Australian share of international student market are coming from some Asian countries such as Singapore and Malaysia. This is evidenced in the campaigns of these countries to optimize their policies of internationalizing higher education and become competitive Asian education providers in attracting international students, who may currently see Australian institutions as their best option. On top of this, other Asian countries such as China and South Korea have also focused more on developing their own higher education sector, which has the potential to stem the flow of students from these countries seeking to study overseas. So, a more and more competitive worldwide market is developing and Australian

tertiary institutions need to understand where they are now and how best to respond to those challenges.

Drawing on students' writing, student and lecturer interviews, and the twin constructs of Lillis' (2001) heuristic and positioning theory (Harré & van Langenhove, 1999) for data analysis, this study explores how international students from China and Vietnam in different disciplines in Australian higher education interpret and adapt to disciplinary requirements and how academics accommodate the diverse needs of international students. This study documents the complexities and multi-layered nature of the adaptation process that the students go through in their efforts to mediate their academic writing, a key practice in higher education. The analysis of the international students' practices shows the emergence of three main types of adaptation that individual students make in their process of participating in disciplinary practices. These are described in this study as: *committed adaptation, surface adaptation* and *hybrid adaptation*. It will be argued in this paper that reciprocal adaptation from international students and academic staff rather than the onus of adaptation being placed on international students is paramount to the enhancement of teaching and learning and the sustainable development of international education. The findings of the study give insights into ways that a dialogical pedagogic model for mutual adaptation can be developed between international students and academics. The model offers concrete steps towards developing reciprocal adaptation of international students and staff, which has been argued to be increasingly important to the sustainable development of international education.

SETTING THE CONTEXT

It has been argued that the rapid expansion in the international student cohort in Australia has seen little change in higher education teaching and learning (Marginson, 2002; Webb, 2005; Marginson, 2007). Although the Australian education export industry has been successful in business methods and 'economic terms' in general, there seems to be less scope for the development of the relevant academic and research capacities in response to the changing student population and demands in the global context (Marginson, 2007). In practice, many institutions appear to be struggling with internationalizing their curriculum (Webb, 2005). At the same time, the general decrease in the direct government funding for higher education has resulted in an increased ratio of staff to students, increased teaching loads and larger tutorials and lectures, thus making it even more difficult to respond to unfamiliar and diverse student characteristics. Academics seem to be under more pressure to meet the needs of international students, yet many are unclear about how to do this. In particular, many lecturers are dealing with the dilemmas of how to address international students' needs while at the same time keeping up with what they perceive to be institutional academic expectations and standards (Ryan & Carroll, 2005).

Problems facing international students in higher education in English-speaking countries have often been assumed to be largely related to language proficiency levels and to cultural differences (Samuelowicz 1987; Elsey 1990; Robertson, Line, Jones, & Thomas 2000; Lacina 2002; Holmes 2004; Parks & Raymond 2004; Andrade 2006). Too often, international students have been seen only from a 'deficit' frame. This frame tends to locate international students' challenges as emerging exclusively from their cultural backgrounds and consider their different ways of constructing knowledge as being problematic in the English medium institutional context. There has been extensive research into international students' learning styles, language proficiency, challenges and expectations. Nevertheless, little has been documented about what is actually involved in the process or processes that these students must undergo to adapt to the academic culture of the disciplines they are studying.

An emergent stream of literature has problematized the common stereotypes about the cultural learning styles and experiences of Asian students (see, for example, Biggs 1997; Rizvi 2000; Doherty & Singh 2005; Kettle 2005; Koehne 2005). Highlighted in these studies is the need to avoid simply attributing learning styles to cultural backgrounds. Instead, these studies suggest the significance of exploring more adequately the complexities in students' processes of unpacking, interpreting and

adapting to various disciplinary practices. This study attempts to contribute to this growing area of knowledge. It acknowledges that international students bring distinctive cultural resources and literacy backgrounds with them into their courses in Australia. It also highlights the complex factors which affect how international students exercise personal agency in mediating academic writing and gaining access to their disciplinary discourse. By focusing on 'personal agency' of international students, the study offers a change from the dominant approaches on 'problems', plagiarism and policing of standards often circulating about international students. The study also explores the possibility for reciprocal adaptation, where international students adapt to academic requirements and academics attempt to modify their teaching approaches in response to the changing needs of the relevant student population for sustainable academic development.

Academic writing is a key practice in higher education and plays a critical role in students' academic success. Hence, capturing international students' practices in participating in disciplinary written discourse has become an area of increasing significance. This emerging research stream moves beyond past research which emphasized on exploring the writing problems international students experienced. It has focused more on viewing international students as individuals attempting to enter a community of practice and become fully fledged members of their discipline area. As a result, issues concerning the cultural values and disciplinary beliefs surrounding student writing are now being taken into account in an increasing number of studies (Connor 1996; Ferguson 1997; Phan 2001; Morrison, Merrick, Higgs, & Le Mactais 2005). Despite these developments, students' agency and personal factors, which tend to represent what may lie behind their attempts to mediate their writing and adapt to academic expectations, remain largely invisible across various studies on student writing at the tertiary level. Also, the comparison of international students' experiences of disciplinary writing in high-stakes areas, such as the assessment for a Masters degree, and academic staff expectations, is potentially critical. Insights into this aspect of the academic life of international students may contribute to working out ways to facilitate students' participation in higher education through disciplinary writing. Regrettably, this issue has been largely unexplored in past studies. The study reported in this paper attempts to respond to these gaps in the literature.

Reciprocal learning development is related to the ways students attempt to accommodate institutional requirements and the ways academic staff adapt their teaching to assist international students in their participation in the disciplinary community. Research, in recent times, has focused on how teachers mediated between different sensibilities in terms of culture, politics and religion in their pedagogic practices of teaching international students (Singh & Doherty 2002). The need for academics to adapt their teaching practices is therefore in part rooted in the emergent needs of diverse student population. Their adaptation is also viewed to be embedded in the reflective teaching practice. This practice involves academics in continuous critical evaluation, modification and transformation of their own teaching (Prescott & Hellsten 2005:91). As suggested by Ryan (2000:5), 'Universities need to respond to the needs of international students by opening not just their doors for them, but once in, making sure that the curriculum is also accessible'. She argues that amongst a variety of factors, understandings of the learners and the learning context help to make the curriculum accessible to students from diverse cultural backgrounds. Central to staff awareness of international students as learners in the new discourse community is their understanding of prior learning experience of international students, including the writing conventions associated with their prior learning. This also links to the understanding of alternative approaches and interpretations of academic traditions (Cortazzi & Jin 1997). The understanding of differences from international learners, as Ryan (2000:5) argues, should aim not only to 'tolerate' differences but to 'respond positively' to them.

THEORETICAL FRAMEWORK

The study reported here focuses on Chinese and Vietnamese international students in Education and Economics due to a number of reasons. China is one of the leading sources of international students for Australian institutions (AEI 2008). At the university where this was conducted, international students from China comprise the largest proportion of international students. In addition, recent

analysis has revealed that at this university, there has been an emerging postgraduate student growth from Vietnam. Chinese and Vietnamese students from two disciplines, Economics and Education, were selected for the study. Economics is the biggest faculty and it has the largest enrolment of international students at this Australian university. Education is one of the disciplines in the university, which has recently seen a rising trend in the international student cohort.

The students in this study were required to meet the cut-off IELTS score of 7.0 and 6.5 in order to gain the entry to their Master course in Education and Economics respectively. These seven students have been selected because they meet the research criteria of this study. They are Chinese and Vietnamese students enrolled in Masters of Education or Economics. They volunteered to participate in the study and were willing to reflect on their experiences of writing their first text at the Australian university as well as on how they participated in disciplinary writing as they progressed through the course six months later. The lecturer participants selected are those who lectured in the disciplines in which the student participants were enrolled and who volunteered to participate in the study. The data was a combination of students' assignments, the lecturers' comments on these students' texts, two rounds of interview with the students and two rounds of interviews with the lecturers. All respondents presented in this study have been given pseudonyms.

The study reported in this paper draws on a trans-disciplinary framework (Figure 1 below) for exploring students' adaptation and lecturers' views on student practices. The investigation framework drew on two interpretive tools, a modified version of Lillis' (2001) heuristic for exploring student meaning making and positioning theory (Harré & van Langenhove 1999). The integration of these two analytic models represents a trans-disciplinary approach for social analysis of student writing practices, lecturers' views and discourse. Lillis' (2001) heuristic offers insights into the real accounts of the students as the 'insiders' or 'producers' of their own texts and for uncovering students' individual reasons and intentions as their hidden logics in the construction of texts. This framework enables an exploration of not only the reasons underpinning their specific ways of writing but also their potential choices in constructing disciplinary knowledge, which Lillis (2001:51) refers to as "what the individual student-writers might want to mean in a transformed socio-discursive space".

Positioning theory (Harré & van Langenhove 1999) has been used to enrich Lillis' model for the analysis of students' voices within institutional context and how they may shift their perceptions of academic writing as they progress through their courses. Positioning theory is concerned with aspects of dominant discourse rules and conventions, rights, duties and obligations in discursive practices (Harré & van Langenhove 1999). This theory highlights students' positions within the institutional structures and how they may reposition their ways of academic writing over a period of time. It thus allows an exploration of how the Chinese and Vietnamese students exercise personal agency through making choices among different ways of meaning making, accepting, accommodating or rejecting dominant conventions within the institutional realities of the university. Positioning theory is also adopted to interpret students' writing and the institutional practices from the lecturers' perspectives, which are not addressed by Lillis' (2001) *talk around text*, thereby adding an important layer to the analysis.

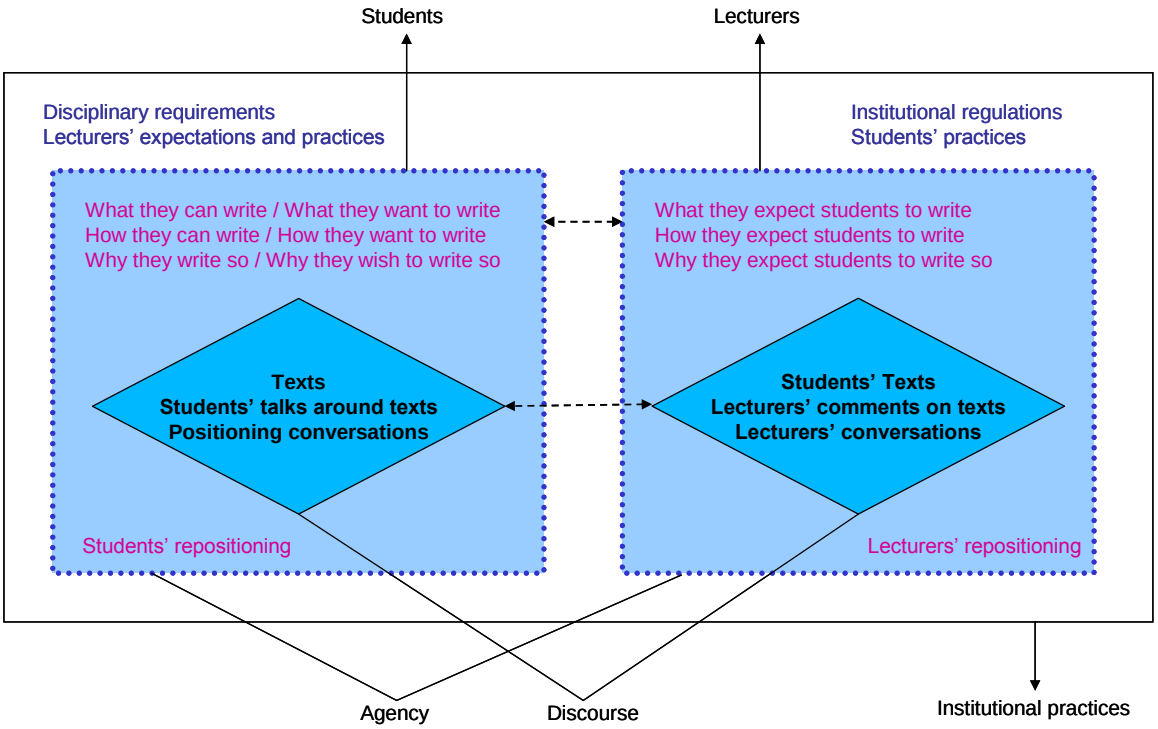

Figure 1: An integrated framework for interpreting students' academic writing practices and lecturers' views (Source: Tran's PhD Thesis 2007)

The framework presented in Figure 1, which represent three categories inherent in positioning theory: discourse, agency and institutional practices (Nellhaus 1998:18-19). The three dimensions of Lillis' *talk around text* are embedded in the second level of the framework, which is centred on the issue of agency. Level 1 of the framework refers to discourse. In this study, discourse for the students is considered to be related to their written texts, their accounts of writing these texts and their later positioning conversations on their writing practices. With regard to the lecturers, discourse is tied to the students' texts and their comments on the students' texts, their discussions about their expectations and their disciplinary values. Discourse offers the context for the students' agency, the lecturers' agency and the institutional practices to emerge. Level 2 of the framework deals with the aspect of agency. Within this study, students' agency is understood as their intentions and personal choices in relation to meaning making in academic writing. The students' ways of constructing their texts can be bound to their awareness of their lecturers' expectations and the disciplinary requirements, their distinctive Chinese or Vietnamese writing tradition, their personal preferences in meaning making and their negotiation of these different interpretations of academic writing. The lecturers' agency emerges from the reasons underpinning their comments on specific instances of students' writing as well as their views on students' writing experiences, their own teaching practice and the disciplinary values in terms of academic writing. Within positioning theory, individual agency operates within social structure but also helps to form social relations. The institutional practices, which are addressed at level 3 of the framework, can be interpreted in relation to the lecturers' expectations, the course guidelines, the disciplinary as well as institutional requirements for academic writing and the students' practices. The structures of the disciplines can shape students' writing and at the same time offer the possibilities for the students to reproduce or transform the disciplinary practices.

There are three main forms of positioning which arise from the students' accounts of writing within the institutional structures in this study: situations of *self-positioning*, situations of *forced-self positioning*, situations of *positioning of others*. *Self-positioning* arises when one wishes to express his/her personal agency in order to achieve a particular goal in discursive practice (van Langenhove & Harré 1999:24). With regard to *forced-self positioning*, van Langenhove & Harré (1999:26) propose that it is different from deliberate self-positioning in that 'the initiative now lies with somebody else

rather than the person involved'. In the case of this study, *forced-self positioning* is related to how the students position themselves in the ways they think they are required by their lecturers or their subject disciplines. *Other positioning* is that one's intentional positioning of oneself in a certain way can lead to the positioning of someone else in the correlative position (van Langenhove & Harré 1999).

THE STUDY

The analysis of the findings shows different forms of adaptation emerging from the ways the Chinese and Vietnamese international students exercise personal agency in writing their first essays at the Australian university. These have been identified within this study as *surface adaptation*, *committed adaptation* and *hybrid adaptation*. Initially, the students have attempted to accommodate the writing approaches which they think are expected in their disciplines. This process of adaptation arises from their intrinsic motivations to be successful in their courses and to become fully fledged members of their disciplinary community. Where they differ is however in their internal struggle related to what they really value amongst the possible disciplinary writing requirements they adopt in constructing their texts.

Surface Adaptation

The accounts of Xuân and Hao seem to involve *surface adaptation*, or changes at the face value, which enable them to gain access to their academic discipline and ensure good returns on their investment (Norton 2001) in the courses**.** These students disguised their beliefs (Lillis 2001) and only accommodate themselves to the changes required as a coping strategy in order to engage in their academic community. In other words, they restrain their agency and feel an obligation in response to the requirements of the disciplinary practice. In particular, the new ways of writing they follow are sometimes not what they believe and feel positive about. Their accounts of constructing their own texts indicate a conflict between their desires to communicate meaning in a way which accords with their values and their desire to be counted as a member of their academic discipline. Students may also display *surface adaptation* when they do not feel comfortable or positive about responding to what they think they are expected to write. Xuân, the Vietnamese student, for example, demonstrated strategic agency through making *surface adaptation* in writing her first text for her course at the Australian university though she longed for some space for being creative in academic writing. For her, writing this assignment was like a struggle between different values and in order to be present in the disciplinary discourse, a sacrifice of her personal aspiration in writing had to be made at some points.

Xuân commented on her way of writing for her course in Education:

> I start with something very general and then the next sentence will be less general and the next sentence will be more specific and then I come to the thesis statement. But I mean sometimes when I wrote something, I want to put an anecdote to it but I think is it safe to write this way?... But then in academic writing, they always structure, because when I learn IAP, they tell us like this is the way you write it, like for example this is the introduction, you start with something very general and then it's like a triangle with the point to the bottom. So usually we think it's safe to go with that way rather than try something different and you don't know how your lecturer is, whether she is very strict, for example very conservative, and then he or she think okay this is a piece of formal assignment and he or she did it like an article on a magazine or newspaper. Yeah, many many times I also think that why do I just keep to the old style, I like to change, I like to be creative but I think okay then... Yeah, sometimes I want to write in a different way... I wish it [the academic writing convention] were not so structured like this

In the above quote, Xuân implied that she actually followed the disciplinary convention and went from the general background to the specific idea she wanted to focus in her essay. Despite her adaptation, she showed her desire to go beyond the convention, for example, to include an anecdote in academic

writing. Xuân chose ways of constructing meaning in light of new interpretations in the attempt to gain access to the academic world. That was reflected in the surface of her writing through her choice of a 'safe way' which aimed to satisfy her lecturers' expectations but what seemed invisible from the surface of her text was her desire for having space for being on her own: 'be creative' as she referred to. The application of the *talk around text* model in interpreting Xuân's account highlighted that what she understood to be the disciplinary expectation (what she could write) and what she personally desired to write (what she wanted to write) did not appear to concur. In other words, her preference for being creative in ways of meaning expressions appeared to be challenged and contradicted by her new interpretation of academic writing she learnt from the IAP course. This was an instance of forced self-positioning, which van Langenhove and Harré (1999) refer to as how an individual self-positioned in a particular way, which is initiated by an obligation from an outside force. Unlike Wang, who was willing to adapt to the new requirements and happily shifted her former beliefs, Xuân still cherished her preferences even though on the surface, she forced self-positioned (van Langenhove & Harré 1999) as a student who conformed to what she perceived as being required of her in terms of academic writing. She thus seemed to adapt to the disciplinary requirements at the superficial level.

What made Xuân's account more compelling was her awareness of the significance of the lecturer's personality to the evaluation of her assignment. She appeared to position her lecturer as someone whose expectation and personality were powerful in shaping international students' writing and in order to gain entry into her disciplinary discourse, she needed to be able to interpret these. Within the moral order of the institution (Harré & van Langenhove 1999), Xuân's positioning and overriding concern about the safe way of writing in her academic community illustrated how the institutional practice was represented with its regulations as a gatekeeper to student academic writing. This issue has been raised in related research (Clark 1992; Ivanic 1998). These authors have also called for the need to question and tease out ways of grounding knowledge embedded in the dominant ideologies or conventions in higher education in order to create space for the implementation of inclusive practices.

Xuân's experience in the above specific instance of meaning making indicated that students' personal voices about specific ways of meaning-making need to be taken into account more as part of the university's agenda to develop inclusive practices. Her account also revealed that the agency and power she could be allowed to exercise within the institutional practice was quite restricted.

Committed Adaptation

By contrast, Wang, Vỹ and Bình mainly demonstrated *committed adaptation.* This involved a profound transformation in their writing replacing their existing writing practice with the new one which they judge to be superior to their former one. These students also showed their agency, however, which they did by deliberate self-positioning as consciously choosing to fully accommodate what was required of them. These students feel positive about their shift because the ways of writing which they think they need to respond to the institutional structure are in harmony with what they value and their aspiration to achieve their academic acquired values. *Committed adaptation* occurs when students exercise personal agency and deliberately position themselves as wishing to accommodate what is required of them. In this case, the students value the new ways of constructing knowledge they have adapted to and feel positive about their shift.

Wang, one of the Chinese students involved in this study, for example demonstrated a committed adaptation to her Education disciplinary practices in Australia. When confronting different ideas about academic writing in her discipline, Wang shifted her former belief and negotiated ways of writing the introduction in light of the new belief in an attempt to satisfy the lecturer's expectation and take control of her academic practice. She revealed that she valued those changes: "I am more than happy to change to the way to write like this" and "I think there is certainly, the Western and Chinese ways are different but I prefer the Western one." The dimension of the *talk around text* model (Lillis 2001) embedded in the questions how/what Wang can(not) say; how/what she (doesn't)want to say in her disciplinary writing helped to reveal that the voice she felt she needed to respond to the institution,

which seemed to be in conflict with her Chinese voice, turned out to be the voice she now valued. In light of positioning theory (Harré & van Langenhove 1999), she actively reshaped her interpretation and positioned herself in a more powerful position through employing the accommodating strategy as *committed adaptation*. Wang's changing interpretations and changing positions in the drafting process of this specific instance of writing reflected her negotiation of different identities, being Chinese as she referred to herself and being an international student who was aware of the disciplinary requirement and determined to achieve her academic goal. These two identities seemed to be contradictory in this episode of her account and she adhered to the latter one as it enabled her to be empowered in the new community. The analysis of Wang's positioning through her talk about her actual practice of writing her text (Harré & van Langenhove 1999 and Lillis 2001) indicated that this was a strong case of cultural positioning. She was trying to break free from the Chinese stereotypes that she positioned herself in by making references to her struggle through the process of drafting and redrafting. She shifted quite quickly to position herself as a member of the Education discourse community.

Hybrid Adaptation

The students can also engage in *hybrid adaptation* to their new written discourse through attempts to create a hybrid space for meaning making, like in instances of Lin's and Ying's texts. Ying for example exercised her personal agency by self-positioning as someone who is able to create a blend of the linear way of writing, which she interpreted to be conventional in her discipline, and her personal preference for using metaphors. Within this form of adaptation, the students engage critically and creatively with the disciplinary requirements and treat their first language and culture as a resource rather than a problem.

Ying gave explanations to her way of writing for her assignment in Management:

> That's my understandings, that's my original. I'll use metaphors to explain things to people. It's my personality, my personal preference... Because without this, the content is very dry. Maybe I didn't start it well, so I want to make it interesting and I need to use words with imagination. This is really my understanding of things... Maybe the lecturer will only like facts, very scientific, not imagination, not artistic or anything like that in writing.

Ying employed metaphors to make her writing mode vivid and lively. Talking about her interest, Ying revealed she enjoyed expressing things in the poetic form and she loved music. Embedded in Lillis' (2001) framework is the notion of voice as experiences, which she refers to as aspects of personal life experiences students embrace in their writing. Ying thus brought her voice as personality and personal preference into her disciplinary writing. For Ying, using metaphors and writing with imagination were the ways she showed her own original understandings. Otherwise, as she revealed, she often felt she was repeating someone else's ideas: "You find out everything you wanted to write was written by somebody else, so I mean no real original thought from mine, so that's not a good feeling." In commenting on her writing, Ying other-positioned her lecturer as someone who favoured facts and scientific ways of communicating ideas rather than what she referred to as "artistic" and imaginative expressions. She also self-positioned as someone who attempted to show her original understandings of the issue and to add flavour to her writing even though she guessed that they might not be welcome by her lecturer. Kettle (2005) suggests the need to investigate how international students can be viewed as "agents" who may be capable of transforming their own situation. Ying's self-positioning showed that even though she felt forced to conform to linear writing, she used her own agency to write poetically. The ways she exercised agency signalled the complexities of her process of gaining access into her disciplinary practices. In communicating ideas in her essay, Ying seemed to display *hybrid adaptation* and reconstruct a hybrid site of subjectivity, which was shaped by the external force embedded in her disciplinary practices as well as her internal voice and preference.

The study highlights challenges for international students such as their unfamiliarity with some of presumed common ways of accessing disciplinary requirements, the assessment criteria coded in

abstract wordings and inconsistency in lecturers' expectations on ways of constructing and representing knowledge. However, the positioning analysis (Harré & van Langenhove 1999) of the students' practices indicates how they exercise personal agency by drawing on various strategies to facilitate their understandings of disciplinary expectations. The discussion of the students' interviews shows six ways of learning about the academic expectations which individual students mainly draw on: through the writing guidelines, through dialogues with the academics, through support services at different institutional levels, through the writing model, through the reading of materials in the field and through the lecturers' personal preferences.

The Lecturers' Expectations and Practices

The positioning analysis (Harré & van Langenhove 1999) of the four lecturers shows that they appear to understand the needs of international students and are determined to accommodate them in many ways. Yet, the lecturers also highlight the need for international students to explicitly communicate ideas and develop a logic argument in accordance with the 'Western style'. For example, Andy explained why he expected international students to conform to the 'Western' ways of constructing knowledge:

> I recognize the diversity but I insist on the Western style of logics and arguments. I am afraid that I would say "No you come to a very Western style University... and you need to learn to see the world as these people see it"… I do not mark people down to a fail when they have errors like what I call the mechanics of English... But I would give them a fail if they were not attempting to explain and make a logical connection in your argument and if *you do not play that game, then you can get a fail grade.*

Andy showed his agency through reinforcing an unmediated view of the 'Western' academic practices to which he expected his students to conform. He acknowledged that he recognised the diversity or the resources previously possessed by international students from diverse cultural backgrounds with regard to their ways of constructing knowledge. However, Andy's discussion about disciplinary discourse requirements stressed the issue of being for the 'Western' discourse practices and rejecting the 'non-Western' ones rather than the matter of creating meaningful opportunities for new understandings and new practices within his discipline. This view did not enable students to negotiate ways of constructing knowledge and moving creatively between different discourse practices (Canagarajah 2006). Instead, international students here seemed to be treated as passive and conditioned by the requirements in the new leaning context. This deterministic view seems to be contrary to the aspect of nurturing inclusive supportive teaching and learning environments, which is central to the institutional agenda to internationalize the curriculum.

Andy's statement indicates his positioning of international students as 'Other' and the Australian institution as 'Self'. He constructs the Australian institution as 'our' Western style university where the international students as the 'Others' who 'need to learn to see the world as these people see it'. His positioning implies the superiority of the Self or the 'Western' ways of thinking while viewing international students as being deficit and need to conform to these 'desirable qualities' that 'we'/the Self possess at the Australian university. In addition, through employing the metaphor of international students as those who played the academic game within the institution, Andy again highlighted their duties and obligations to accommodate the 'Western' logic to make sense of the world and develop arguments. This accommodation allowed them to get access to the academic world at the Australian university. Otherwise, they would be marginalized with the risk of not passing the course, which negatively affected the returns on their personal investment (Norton 2001) in studying overseas.

Once international students are positioned in this way, the quality and effectiveness of teaching is less problematized and the students' conformity to the existing practices is more emphasized. Thus, this may restrict possibilities for transformation in terms of pedagogical practices among the academics and within the curriculum. Some lecturers also position students from China and Vietnam as having

'deficits' in the new learning context, based on their English language competency and their different ways of constructing knowledge. Students' different experiences and ways of learning are not viewed as 'different' but rather as 'limited' by the academics. Even though the lecturers attempt to find ways to facilitate students' understandings of the conventions, there is little mutual transformation occurring in terms of negotiating different ways of constructing knowledge.

In line with their other-positioning of students as those who have to conform to the taken for granted institutional conventions, the lecturers self-positioned as being dynamic in seeking ways to facilitate students' understandings of what was required of them. Lisa, the Economics lecturer, for example tried to give students assignments in the beginning weeks of her course and offered feedback on them within a week so that students could learn from this experience. Andy attempted to link the abstract concepts to specific examples to make the theories more understandable for international students. Positioning theory includes the possibilities that individuals can reposition their views and take action to transform institutional practices when encountering new challenges (Harré & van Langenhove 1999). In light of positioning theory, these actions were examples of how the growing number of international students offered possible conditions for the lecturers to transform their teaching and the institutional practices to be restructured in order to make the curriculum more accessible for students from diverse backgrounds. However, as revealed by the academics, these good practices remained largely at the individual level rather than becoming common at the disciplinary or institutional level. Also, these good practices were mainly aimed at making lectures and academic requirements more accessible for international students rather than creating opportunities for them to negotiate academic resources and thus engage more meaningfully and productively in academic practices.

Interaction between Students and Academics Dialogical Pedagogic Model for Mutual Adaptation and Sustainable Academic Development in International Education

All students in the study perceive the interaction they establish with their lecturers to be imperative in enabling them to enhance their understandings of the academic expectations and facilitate their adaptation to academic practices. Three main forms of dialogues, which the students established with their lecturers, have emerged from this study: face-to-face consultation with the lecturers, emails to the lecturers and discussion with the lecturers in class. In particular, the students transform their own practices through seeking ways to contact their lecturers, either through written forms or direct dialogue, to deepen their understandings of the disciplinary expectations, ask for feedback on draft versions of writing assignments and go through the redrafting process. They are quite successful in using different ways to increase their understandings of the disciplinary expectations and even found the process rewarding. The academics also reveal that through conversations with international students who actively discussed their needs, they increase their understandings of the needs of international students and how to accommodate these needs. This illustrates how student's agency may have impact on staff's positioning of their views, which leads to the changes in their teaching. In other words, students' ability to exercise personal agency through taking the initiative to communicate with staff helps to create the conditions for transformation of individual lecturers' practices. Below are some quotes which illustrate the value of interaction perceived by the students and academics:

> Because in my particular case, I feel a lot of repetition all over the place and I feel a bit worried about that because I don't know whether I understand the case correctly and I had to go to the consultation to ask my lecturer and what she told me is that yeah it's the nature of the theory and you applied different theories in different situation, so your case is still appropriate, so it's not like I think because if you read the case, you see I repeat a lot about the humour aspect (Vy - student).

> Yes, I feel ambiguous about the expectations in the other course like Language methodology and curriculum design, about the creation of the unit of work. Most of my classmates don't understand what we are expected to do and we discuss with the lecturer again and again and he is also confused and finally I think he has to ask Rachel again about how to write up those units of work. She designed the whole course. If you don't understand the expectations or the assessment criteria,

you cannot write up the assignment, this is very important to know what you are expected to do (Wang - student).

I remember one of our graduates some years ago told me that the difficulty he found there were no equivalent words in Mandarin for a lot of concepts we are using and students struggles because of the nature of the Chinese economy, that word has not come to their language, it makes it very hard for international students. So how do I deal with this, it changes the ways I teach, I often speak too fast but I do try to slow it and I try to find different words that I try to explain a concept but I can't always do that because sometimes there is a term or word I must use, so I try to find different ways of explaining them in terms of example, what do I mean to make it as simple as possible (Andy - lecturer).

Again I had conversations with students over a year, it sounds crazy but an academic essay in English, I can see why some students can get repetitive or redundant because you have to start off by saying what you are going to say and then you say it and then at the end you say what you have just said and it seemed crazy because you have to have those signposts very clear there. Otherwise we tend to think that it's loosely constructed or not logical or not coherent. The marker, the native speaker, starts thinking that this is not coherent (Kevin – lecturer).

The findings of the study offer some insights into ways that mutual adaptation can be developed between international students and academics rather than the onus being on total adaptation from the students. The findings highlight student's agency embedded in their communication with staff as the point where the two groups, students and lecturers, can interact so that the possibility of changes may occur in terms of pedagogy and curriculum. A dialogical pedagogic model for mutual adaptation for both students and teaching staff for sustainable academic development has been developed by modifying Harré's two-dimensional conceptual space (van Langenhove & Harré 1999), the public/private and the individual/collective. This model is presented in Figure 2. Drawing on Vygotsky, van Langenhove and Harré (1999) use the public/private dimension to represent the degree to which the display of the attributes of academics and international students is public or private. The individual/collective axis refers to the degree to which "some attributes can be realized as the property of the discursive interaction of one or many persons" (p.131).

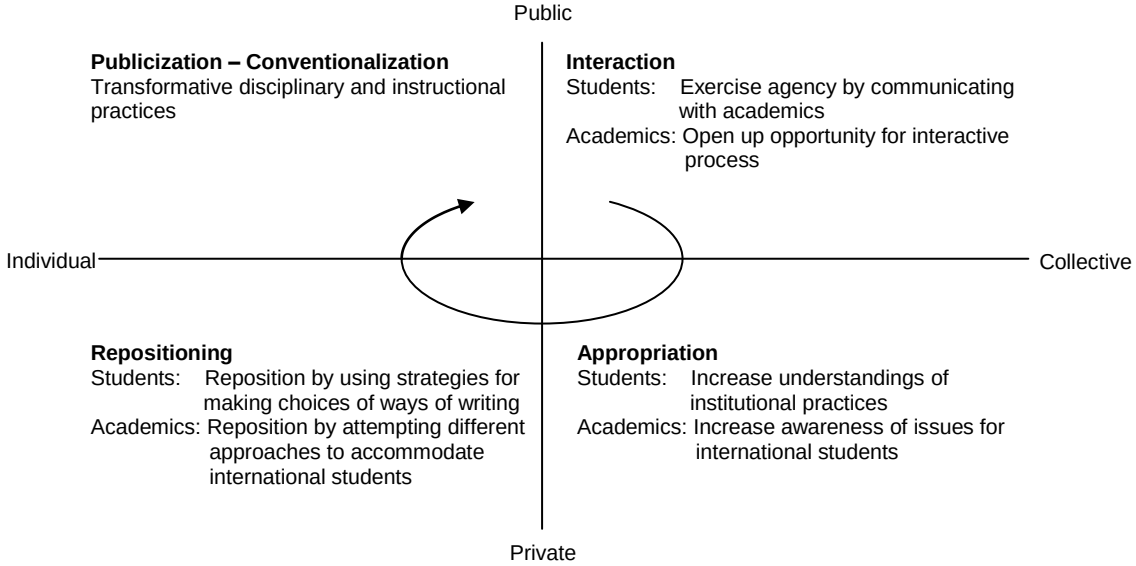

Figure 2: The dialogical pedagogic model for mutual adaptation

The model includes four quadrants: *interaction*, *appropriation*, *repositioning* and *publicization*. The first process, interaction, is illustrated in the upper right hand side corner of the model. The *interaction* quadrant represents how knowledge and experience may be shared between academics and

international students. Interaction occurs when lecturers create opportunities for international students to communicate with them and students exercise agency through their attempts to communicate with academics. This interactive process is collective and public.

The second process is *appropriation*, which is represented in the lower right hand side quadrant of the model. The appropriation of knowledge of the discursive practices of academics and international students within the institutional structure can be represented as the transition from the *interaction* quadrant to the *appropriation* quadrant. This appropriation is reflected in how knowledge gained from the interaction with each other would enable academics to deepen their understandings of the issues related to international students and would assist international students to increase their awareness of the institutional practices. This process marks the move from the public to the private quadrants.
The third process, *repositioning*, is represented in the lower left hand side quadrant of the model. Transition to the *repositioning* quadrant links to the privatization and habituation shift in which academics would rethink and critically reflect on their teaching practices. This goes along with their attempts to change their practices and adopt teaching approaches to better address international students' needs. In this process, international students would exercise strategic agency to facilitate their participation in institutional practices based on their insights and understandings. International students can transform their own practices if they are provided with the resources and opportunities to make changes. Different types of relationships and interactions will enable different ways of appropriating knowledge and different responses to be made. This process highlights how the expectations and needs of academics and international students can be included and addressed.

The upper left hand side quadrant represents the *publicization*/*conventionalization* process. When academics and international students have internalized the new understandings and transformed their own practices, this leads to the transformation of disciplinary and institutional practices. Appropriated and privatized knowledge and experiences thus become publicized and even conventionalized in the institutional discourse. This model is not a one-way cycle. It can go back and forward between quadrants before it leads to publicization. These interactive processes appear to be fundamental toward enhancing the quality of learning and teaching within the current trend of internationalization of the curriculum and need to be nurtured by the university.

CONCLUSION

The case study reported in this study explores the adaptation of seven international students from China and Vietnam in two disciplines, Education and Economics, at an Australian university. A prominent finding of the study indicates the emergence of three main forms of adaptation, *committed adaptation*, *surface adaptation* and *hybrid adaptation*, that the students employed to gain access to their disciplinary writing practices. The findings of the study also give insights into how students' skills and capability to interact with lecturers can possibly lead to the opportunities for lecturers to reposition their views and practices. This occurs when lecturers attempt to modify their writing instructions and make them more explicit and work out what to do to assist international students in terms of academic writing and how to refine their teaching in general. Seen in this light, the students' participation in disciplinary practices and their actions can nurture the potentials to change and transform individual and institutional practices. Interaction between the international students and the academics also helps to develop mutual understandings between students and lecturers. These steps may contribute to facilitating the participation of diverse student population in higher education and making them become truly valued members of the institutional communities. Within the context of the internationalization of Australian higher education, reciprocal adaptation of academics and international education is critical to the process of sustaining the reputation and standards of the higher education sector for high quality education. The mutual changes are even more critical given the current institutional responses and policies which have focused more on international education as an export industry and commodity and less on the aspirations of international students and the enhancement of academic pedagogies which cater for the needs and acquired values of international students. This imbalance may threaten the sustainable development of international education, which

is becoming increasingly important to the long term economic, academic and social benefits to Australia.

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Developing and Sustaining Perpetual School University Partnerships

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ABSTRACT

A Bachelor of Education course was developed at Edith Cowan University (ECU) Joondalup in 2002 with a significant focus on creating and sustaining mutually productive relationships with partner schools. These industry partnership links have afforded authentic workplace opportunities for prospective teachers to develop contextually, whilst undertaking field placements and making valid contributions to partner school priorities and children's learning. This has involved all stakeholders developing collegiality and professional interaction from a position of trust, respect and sense of contribution to the whole (Marlow and Nass-fuka, 2000). The involvement of industry partners is of a completely voluntary nature and hinges, almost entirely, on a commitment to teacher education and peripherally associated benefits. Sustaining the principles, processes and relationships on which partnerships have been developed is however, a consistent challenge.

This paper outlines the development of professional relationships, the provision of service to schools through intensive teaching units and the central role of professional practice in the course, with explicit links between practice and theory. A model has evolved which supports the retention of stakeholders with the partnership at various developmental junctures of their careers that reflects the key elements of interdependency and mutually beneficial relationships for stakeholders within the school-university partnerships at ECU Joondalup. The partnership model affords stakeholders access and re-access points from undergraduate level to post-retirement and aims to retain school/industry partnership commitment, lifelong links to ECU and a sustainability provision for the future.

INTRODUCTION

The Kindergarten through Primary (K-7) Program discussed in this paper was established at Edith Cowan University, Perth in 2002. The course was housed at a newly opened satellite campus in the rapidly developing northern suburbs region of the Perth metropolitan with an investment focus on the introduction and development of mutually beneficial partnerships with educational establishments in the Kindergarten and Primary sectors. It was hoped that by engaging partners in genuine and lasting collegial relationships a sustainable model for workplace learning in teacher education would eventuate despite the increasing difficulties faced by universities in Western Australia in gaining practicum places for pre-service teachers. The impact of curriculum evolvement, teacher accountability and workload, the decrease in the public status of teaching and consequent increase in the union activity were just some of the factors surrounding the climate for accessing industry partners in support of pre-service professional experiences in the workplace.

In 2007, five years after the inception of this course, The Commonwealth of Australia, House of Representatives Standing Committee on Education and Vocational Training released the *'Top of the Class Report'* on the inquiry into teacher education. The report detailed the importance of establishing strong, authentic partnerships between schools and universities and collaborative approaches to practicum, research, induction and professional development was identified. Our university-school partnerships prefaced this, striving to provide authentic opportunities for prospective teachers to learn

in the continually changing and evolving context of practice, whilst also contributing to school priorities and children's learning. However, one characteristic that is critical to the sustainability of our partnerships has been that of interdependence and the principle that within the collegial practice of teaching, teachers, teacher educators and pre-service teachers develop both individually and collectively in the context of 'interdependent relationships'.

In securing 'interdependent relationships' it is crucial to continually draw on the fundamental principles on which this course and associated partnerships were founded. Central to these relationships were processes that focused on enhanced learning for children. Commitment to bridging any theory/practice nexus required stakeholders to engage as authentic 'learning partners' with the collective aim of enhancing teaching and learning. Opportunities were made available for stakeholders to pursue collaborative curriculum inquiry, curriculum development, teaching practice assessment and collaborative professional development opportunities. This process reflects Wenger's (1998) conception of learning in the context of communities of practice by a process of negotiating meaning through engaged participation and draws on the partnership work developed by Victoria University of Technology whereby the workplace learning experiences of pre-service teachers was conceived quite differently from the normal practicum models, along with a more flexible course structure and changing roles of university staff. (Kruger, Millwater, Yarrow, Short, Cherednichenko, Hooley & Moore, R, 2001).

As a result of this a model of interacting with schools in partnerships was conceptualized with the aim of forming valid partnerships grounded in collegial processes whereby stakeholders develop in the context of 'interrelated relationships' typified by trust and respect. A formally constituted partnership with shared purpose and clearly defined roles has significant effects such as optimising stakeholder outcomes and enhancing the professional development of all parties. Ironically the greatest challenge has arisen as a result of the success of the program and the growth in partnerships with schools. With the consequent increased numbers of stakeholders, sustaining meaningful professional relationships with schools is an ongoing challenge.

Contrary to local and national trends, enrolments in this program continue to increase bringing with them countless challenges, competing with associated benefits. Moreover, locally in Western Australia, there has been a marked decline in the number of teacher education applications. The Western Australia Tertiary Institutions Service Centre (TISC) data indicates a total of 2,646 students had first preference applications for teacher education courses over the 2007/08 year, which is down significantly (almost half) from the peak of 4,706 first preference applications in 2003/4. In direct contrast our K-7 teacher education program has seen the required numbers of placements soar by almost 80% over the last six years, whilst the number of active partnership schools has increased by a similar figure to 120 schools. These schools host an average of 10 professional practice Pre-service teachers annually. During this time of significant program growth permanent academic staff directly involved in the program has remained in single figures, whilst 70% of teaching is undertaken by contracted, sessional staff, to alleviate impracticable workloads for program staff.

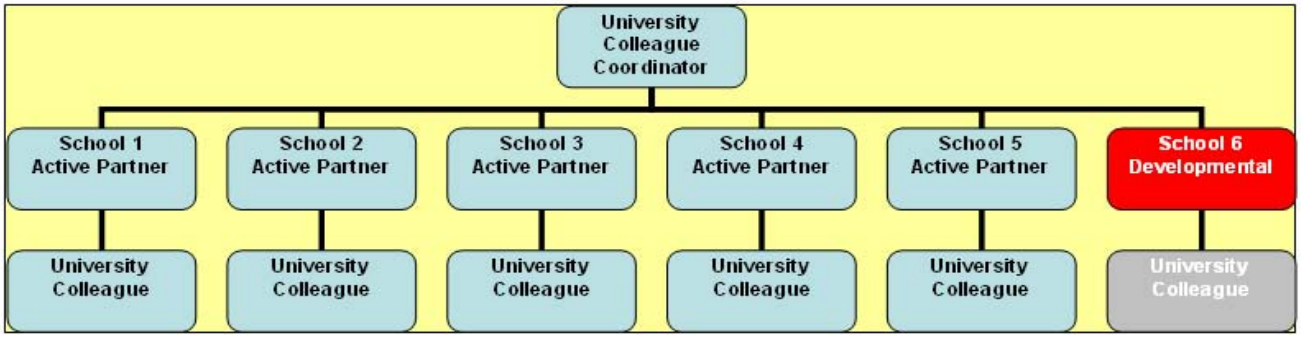
This successful expansion has relied greatly on incredible 'grace and favour' commitment levels from staff, aligned with a strategic approach to safeguard the uniqueness associated with the program's achievements. Indeed, core staff have laboured tirelessly in addressing the perpetual complexities of preserving close and meaningful relationships with stakeholders within partnerships comprising university staff, contracted teaching staff, school partners and pre-service teachers amongst significant others. Beck & Kosnick (2000) stress the importance of the involvement and commitment of university teaching faculty in the practicum for strengthening school university partnerships. The robust partnership links and the program's enhanced reputation within the teaching community have certainly benefitted from the commitment of staff, although, this in itself presents a quandary regarding sustainability amongst these people.

Bullough et al (1999) warn that some partnerships are driven by short term rather than long-term gains and engage little research into the costs and benefits to all stakeholders. However as the staff to stakeholders ration is impacted upon through growth, furnishing mutually beneficial partnerships is an increasing challenge. Whilst the program maintains cost effectiveness there is no indication of investing university time and funds to afford academic staff further time to invest in partnerships, with a consequence of a dilution in the strength of relationships with the very same partners who co-constructed this program and who have welcomed hundreds of pre-service teachers into their workplace to undertake professional experience.

We must consider whether this will prelude the acceleration of the 'fading face' of University within our partner schools. Jasman (2002) contests that teacher educators have long been significant in their absence in schools whilst Cooper and Jasman (2002) also allude to the significance of stakeholders wishing to communicate with a permanent university 'face' providing incidences for school and university staff to engage in genuine dialogue surrounding bigger educational issues and a lack of engagement, and perceived commitment, from particular programs in universities. Partners invest constant efforts in mutual understanding of programs, outcomes and philosophies that support partnerships in meeting the needs of stakeholders. Confronting this challenge has required an emergent restructure of the typical roles involved in the area of professional experience, whereby collaboratively working partnerships are high on the agenda. Teachers are now regarded as 'mentors' rather than supervisors and university staff are regarded as 'colleagues' with some responsibility for bridging the theory-practice nexus cited by Bullough et al (1999) as creating a cultural division characterised by deficiencies in shared vision and agreement of larger issues in education.

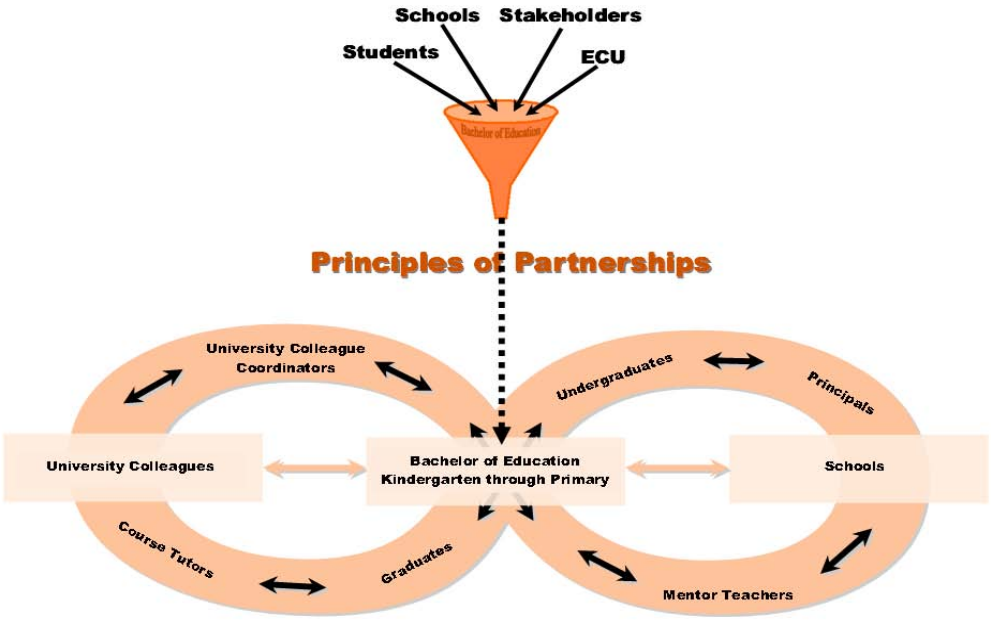
In order to link core academic program staff to workplaces without compromising the authenticity of partnership relations in a growing field has been difficult. This has been addressed, if not completely overcome, by them assuming the role of 'University Colleague Coordinator' with a negotiated commitment to maintain discourse with a portfolio of five or more partnership schools. University Colleague Coordinators also undertake to nurture a partnership with one other less active or inactive school annually. University Colleague Coordinators also liaise with several University Colleagues (Associate Staff) directly regarding the schools in which they are involved. These activities account for less than 70% of schools that the course is able to access. The remainder of schools, which have been strategically identified as requiring increased levels of input are allocated to a designated Professional Practice Coordinator whose academic workload is reduced accordingly as the role requires frequent contact with schools. The Professional Practice Coordinator also commonly contributes meaningful and personal support for schools, school staff and the University Colleague (Associate Staff) to broker and maintain collaborations. These examples of the development of functional and equitable partnership are instances of what Marlow & Nass-fukai (2000) describe as the two elements essential for the development of collegiality - strong relationships and the validation of colleagues as equal.

This model outlined is presented in the form of a diagram below;



A revision of the conventional 'teaching practice' supervisory role of university staff has also ensued as 'University Colleagues' have replaced supervisors. These members of staff were sought via recommendation from Principals in partnership schools, once again extending collegiate interdependency of stakeholders. University Colleagues have experienced partnerships from multiple perspectives working simultaneously in school and university roles and a number have accepted contracted teaching positions, further empowering colleagues through their contribution at all levels. University Colleague access induction training' and 'professional development' opportunities, although a more apt, if less succinct, description of this would be 'developing joint understandings collegially through interactive processes focused on negotiated needs' rather than autocratic direction. The recruiting method sees University Colleagues return to the classroom from temporary periods of absence having developed further awareness of the associated partnership benefits. It has also meant that positive partnership experiences receive wider exposure in schools from knowledgeable and trusted advocates. However, retention of staff to work year on year as University Colleagues has been problematic as work opportunities are sporadic throughout the year and carry remuneration packages that are dwarfed by more lucrative relief teaching opportunities.

Just as all stakeholders, University Colleagues are actively encouraged to remain members of the partnership community at some level to assist in continuation, development and expansion of ongoing partnerships. As the diagram below shows, stakeholders were responsible for the development and conceptualisation of the principles of this program. As retention of partners is critical to the sustained development of partnerships it is hoped that as graduates enter the teaching profession they may retain involvement as contracted course tutors, mentor teachers, partner school Principals, post graduate students, future academic staff and subsequently University Colleague coordinators. As this approach is in the infancy period there is little research to support the sustainability at this stage and there is a lack of definitive literature to inform in the area. However, it is clear that the partnership cycle can be accessed at any level from undergraduate to retirement at levels suitable for all stakeholders. It is hoped that in fostering collegial relationships with common goals of the enhanced learning for children and a commitment to teaching and teacher education a model of sustainability will ensue.



This model is immediately defunct without the development of relationships and real conversations around the shared context of children's learning through the practicum, coursework between faculty members, pre-service teachers and school staff. We have attempted to facilitate this with School University Reference Group (SURG) seminars, bringing stakeholders together to share current teacher expert knowledge of teaching and learning with current university educational thinking to enhance

understanding for the whole partnership community. Membership of SURG is fluid, subject matter is identified by any stakeholder at any time - demonstrating Wenger's (1998) principles of mutual engagement, joint enterprise and negotiability of the repertoire, attendance is voluntary and focus influenced, there is no financial incentive for participation and activities take place outside of school hours. Positively, this attracts participants who are committed, stimulated and keen to engage. However, with current and very public concerns of 'burnout' and the ever-expanding 'role' of today's teachers a substitution effect may prevail at any time that will impact on such initiatives adversely. This is especially significant when comparing the Price Waterhouse Cooper 2001 study with that of Hilsum & Cane's 1971 work, which shows an increased weekly workload for teachers of 23% over the last thirty years.

CONCLUSION

If a partnership littered by mutual engagement, collegiality and equitable interdependent relationships amongst stakeholders holds the key to sustainability this example provides insight rather than a blueprint. Retaining the integrity of the negotiated principles, processes and relationships on which partnerships, and this particular model of partnerships, have been developed, however is increasingly challenging. With stakeholders, particularly teachers, working to absolute capacity reliance on their continued 'grace and favour' commitment per se would be foolhardy and cannot be assured. In an ironic twist the greatest challenges to this model have arisen as a result of the success and growth of the program. The 'Interdependent relationships' on which so much of the partnership model is based, are becoming increasingly difficult to sustain. Continued success will present continue challenges, although if the growth of those engaged on the model matches enrolments that buck downward trends annually the status quo or better could eventuate in this instance.

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Market Orientation and Performance within Community Enterprises in Upper Northeastern Region of Thailand

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ABSTRACT

The paper is designed to provide a quantitative measure of the effects of market orientation on the performance of the silk-weaving community enterprise's network in the upper Northeast of Thailand. The objectives of this study are two-fold, (1) to examine the validity and reliability of the measure of the market orientation, and (2) to examine the causal relationship between intelligence generations, intelligence dissemination and organizational responsiveness and the performance of the community enterprise network in the upper Northeast of Thailand.

The research mainly involves a survey design. It includes a pilot test using undergraduate business students at UdonThani Rajabhat University for pretesting questionnaire items. In addition, this investigation into intelligence generations, intelligence dissemination and organizational responsiveness attributes necessitates uncovering variables of interest and this involves a large-scale field study.

The data were collected via questionnaire interviews from 192 samples. They included the members of textile community enterprises in 3 provinces (Nong Bua Lamphu, UdonThani, and Loei). Respondents were asked to rate, on a five-point Likert scale, their agreement or disagreement on the market orientation attributes. LISREL 8.30 was used for data analysis since the proposed model is a simultaneous system of equations having latent constructs and multiple indicators. Quantitative data were analysed by the statistical technique, such as structural equation modelling.

The study found that market orientation consists of intelligence generations, and organizational responsiveness of the silk-weaving community enterprise network in the upper Northeast of Thailand. The study also found that there is a causal relationship between intelligence generations, and organizational responsiveness on the performance of the community enterprise network in the upper Northeast of Thailand. The managerial implications are discussed.

Keywords: Marketing concept, Market orientation, Community Enterprise.

INTRODUCTION

Market orientation is a central construct in a theory developed to explain firm performance (Kholi and Jaworski, 1990; Kohli et al., 1993 and Narver and Slater, 1990). In recent years, marketing scholars have focused on the development of marketing orientation in organizations. In recent year, marketing scholars have paid a great deal of attention to the subject of marketing orientation (Homburg et al., 2000; Shoham et al., 2005).

Market orientation is the aspect of business culture that motivates employees through the organization to place the highest priority on the profitable creation and maintenance of superior customer values (Slater, 2001, 230-232; Slater and Narver, 2000).). Market oriented businesses have a competitive

advantage in both the speed and effectiveness of their responsiveness to opportunities and threats (Slater, 2001, 230-232).

However, these studies provide little verification of the external validity of market orientation because they have been conducted in a developed economy setting. Accordingly, attention is now shifting to developing nations for new insights into the market orientation phenomenon. For example, Chelariu et al. (2003) examined the validity of two market orientation scales from Kholi (1990) and Jaworski and Narver and Slater (1990), in Ivory Coast.

According to the tenth National Social and Economic Development Plan of Thailand, small and micro community enterprises (SMCE) will be developed. For sustainable growth, it is substantial to empower the local people in SMCEs. SMCEs are owned and managed by local communities, using the community's resources, with the community creating its own innovations, wisdom being integrated between local and global knowledge, integrating the various activities into the system, with learning as the key factor, and self-reliance being the ultimate goal. Since Thai SMCEs, located in northeastern of Thailand, are quite diverse across different industry sectors there are limits to local clustering and production systems, such as textile, agriculture, milling and tourism. Therefore, this study replicates and extends the market orientation research of Jaworski and Kohli (1993), using a silk-weaving SMCE sample in Thailand. The paper's aim is to study the development market orientation of the SMCE.

REVIEW OF LITERATURE

Defining Market Orientation

Marketing literature has indicated that the adoption of a marketing concept is the foundation of successful performance. The marketing concept is a distinct business philosophy that puts the customer in the centre of the firm's thinking about strategy and operation (Hooley et al., 1990). It is made up of three pillars, namely, customer philosophy, goal attainment and integrated marketing organization.

According to Kohli and Jaworski (1990), while the marketing concept is defined as the philosophy that guides the allocation of resources and formulation of strategies for an organization, market orientation is considered to be the activity involved in the implementation of the marketing concept (Hooley et al., 1990).

Specifically, according to Kohli and Jaworski (1990), market orientation refers to three core aspects, namely, the generation of market intelligence, the dissemination of this intelligence and the organisation-wide responsiveness to it. The Narver and Slater (1990) definition complements this, with three behavioural components (customer orientation, competitor orientation, interfunctional co-ordination) and two decision criteria (long-term focus, profit objective). Based on the scales of Narver and Slater (1990) Jaworski and Kholi (1993), Gray et al. (1998) developed a comprehensive measure of market orientation including interfunctional co-ordination, profit emphasis, competitor orientation, customer orientation and responsiveness dimensions.

Still, Lafferty and Hult (1999) in synthesising 5 perspectives namely the decision-making, the market intelligence, the culturally-based behavioral, the strategic and the customer perspectives (Kohli and Jaworski, 1990; Narver and Slater, 1990), then define market orientation as 4 components: emphasis on customer, importance of information, inter-functional coordination and taking action.

It should be noted that there is still some equivocality over the market orientation-performance relationship. While Sin et al. (2003), in testing the Narver and Slater (1990) instrument on 200 Ivory Coast managers, found that there was a direct relationship, May-deu-Olivares and Lado (2003) who

used the market orientation scales on a sample of 554 senior executives and directors in the European Union, found that any orientation-performance relationship was mediated by innovation.

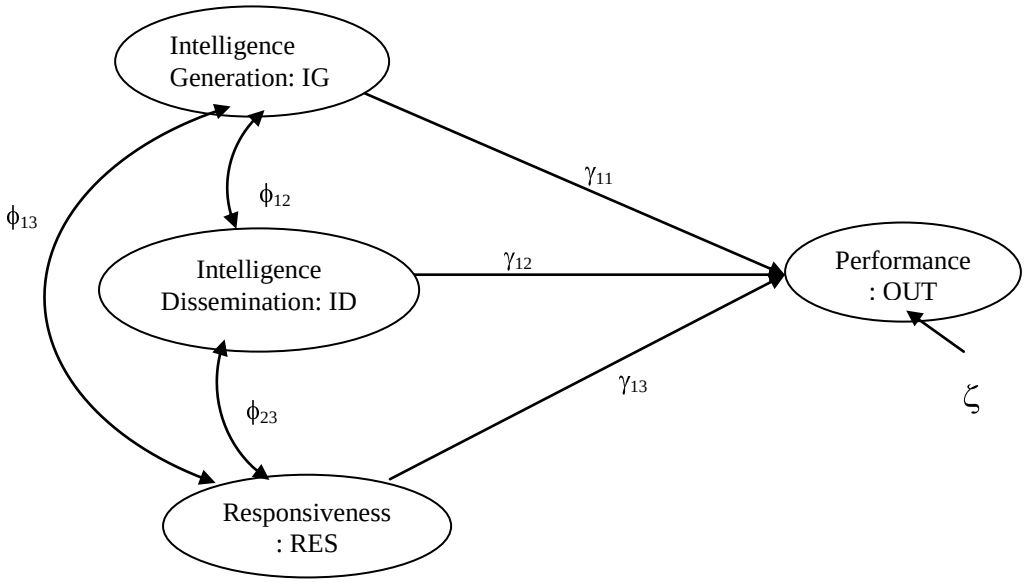

Figure 1: Path diagram of market orientation.

While Chelariu et al. (2002), in testing the Narver and Slater (1990) and Kohli and Jaworski (1990) instrument on 200 Ivory Coast managers, found that the measure of Narver and Slater (1990) outperformed the Kohli and Jaworski (1990) instrument, Gray et al. (1998) found that the measure of Kohli and Jaworski (1990) performed better than that of Narver and Slater (1990). Furthermore, Chelariu et al. (2002) suggest that market orientation consisted of two components: intelligence generation and responsiveness.

A synthesis of recent empirical studies suggests that the following research model (see Figure 1) could be useful for exploring market orientation and performance relationships in a wide variety of country-market contexts. Figure 1 illustrates a visual presentation of 4 hypotheses.

OBJECTIVE AND HYPOTHESIS

The purpose of this study is to investigate the market orientation construct. The objectives of this study are twofold, (1) to examine the validity and reliability of the measure of the market orientation, and (2) to examine the relationship between intelligence generations, intelligence dissemination and organizational responsiveness and the performance of the community enterprise network in the upper Northeast of Thailand.

Kohli and Jaworski (1990) concluded that market orientation consists of three components: 1) the organization – wide generation of market intelligence pertaining to current and future customer need. 2) dissemination of the intelligence across departments, and 3) organization-wide responsiveness to this market intelligence (Jaworski and Kohli, 1993; Narver and Slater, 1990). Thus the following hypothesis is postulated:

H1) market orientation consists of intelligence generations, intelligence dissemination and organizational responsiveness ($\phi_{12}, \phi_{13}, \phi_{23} \neq 0$).

Most research studying the link between market orientation and performance has been conducted in the U.S. Empirical evidence has showed that market orientation has a positive effect on financial performance. Jaworski and Kholi (1993) found a positive relationship between market orientation and overall performance (Sin et al., 2003; Hooley et al., 1990). Specifically, Matsuno and Mentzer (2000) reported a positive relationship between market orientation and market share growth, relative sales growth, and new product sales (Baker, and Sinkula, 1999). Based on the above discussion, the following hypotheses about the market orientation – performance link are formulated and tested in this study.

H2) there is a causal relationship between the intelligence generations and the organizational performance of the community enterprise network in the upper Northeast of Thailand ($\gamma_{11} \neq 0$).

H3) there is a causal relationship between intelligence dissemination and organizational performance of the community enterprise network in the upper Northeast of Thailand ($\gamma_{12} \neq 0$).

H4) there is a causal relationship between the organizational responsiveness and the performance of the community enterprise network in the upper Northeast of Thailand ($\gamma_{13} \neq 0$).

METHODOLOGY

The Sample and Data Collection

The research mainly involves a survey design. It includes a pilot test using undergraduate business students at Udon Thani Rajabhat University, for pretesting questionnaire items. In addition, this investigation into intelligence generations, intelligence dissemination and organizational responsiveness attributes necessitates uncovering variables of interest and this involves a large-scale field study.

The sample was drawn from a list of all small and micro community enterprises provided by the Secretariat Office of Community Enterprise Promotion Board (SCEB), Department of Agricultural Extension, Thailand. From the initial list of 568 firms, a sample of 226 was purposively selected.

The data were collected via personal interview questionnaires. Respondents were asked to rate, on a five-point Likert scale, their agreement or disagreement on the market orientation dimensions. In November 2007, 226 questionnaires were distributed to 226 members of silk-weaving community enterprises in 3 provinces (Nong Bua Lamphu, UdonThani, and Loi). There were 192 completed questionnaires. The response rate of 85% was very high.

Developing a Better Measure

The aims of the present study are to validate what appear to be promising measures of market orientation and to develop scales for measuring market orientation in the Thailand context. Most measures have been academically, rather than managerially, useful. Developing a more parsimonious and generalisable scale has important implications for senior executives who may wish to assess their companies' levels of market orientation and to take steps to improve this, given some evidence of an orientation-performance link.

Whereas Jaworski and Kohli's (1993) later study also addresses managerial and organisational antecedents and consequences of a marketing orientation, the present study omits these. It is considered important to first establish the dimensions of market orientation in the Thailand context, before examining environmental and organisational antecedents and the consequences of a market orientation-performance relationship. This paper adapts the MARKOR scale in Thai SMCEs.

Questionnaire Design

This study utilised parts of the instruments (see Table 1) to test market orientation (Jaworski and Kohli, 1993; Narver and Slater, 1990) in Thailand SMCEs. A total of 19 items were chosen using Cronbach Alpha scores from the original studies as the basis for selection. All these questions are divided into 3 sections such as intelligence generation, intelligence dissemination and responsiveness.

Table 1: Market orientation questions

Scale	Scale Items
Intelligence Generation	1. In the community enterprise, we meet with customers at least once a year to find out what products they will need in the future 2. In the CE unit, we do a lot of in-house market research. 3. We are slow to detect changes in our customers' product preferences. 4. We poll end users at least once a year to assess the quality of our products and services. 5. We are slow to detect fundamental shifts in our industry. 6. We periodically review the likely effect of changes in our business environment,
Intelligence Dissemination	7. We interdependence meetings at least once a quarter to discuss market trends and developments. 8. Market personnel in our community enterprise spend time discussing customers' future needs with other functional department. 9. When something important happens to a major customer of market, the whole community enterprise knows about it within a short period. 10. Data on customer satisfaction are disseminated at all levels in this community enterprise on a regular basis.
Responsiveness	11. It takes us forever to decide how to respond to our competitor's price changes.(R) 12. Principles of market segmentation drive new product development efforts in the community enterprise. 13. For one reason or another we tend to ignore changes in our customer's product needs. (R) 14. We periodically review our product development efforts to ensure that they are in line with what customers want. 15. Our business plans are driven more by technological advances than by market research (R). 16. Several departments get together periodically to plan a response to changes taking place in our business environment. 17. The product lines we sell depend more on internal politics than real market needs (R). 18. If competitors were to launch an intensive campaign targeted at our customers, we would implement a response immediately. 19. The activities of the different departments in this community enterprise are well coordinated.

Six questions deal with intelligence generation. This is one of the three constructs developed and validated by Jaworski and Kohli (1993). Market intelligence is the starting point of market orientation

and is a much broader concept than just finding out about customers. It includes informal mechanisms for generating information.

Intelligence dissemination is the subject of four questions. To effectively respond to market needs requires the participation of virtually all departments in the organisation. This involves both formal and informal means to keep the information flowing freely.

Nine questions deal with responsiveness to market intelligence. If the organisation generates intelligence and disseminates it, but then fails to act on it, then implementation of the marketing concept has stalled. Responsiveness involves the whole organisation, not just marketing personnel. This construct provides the final dimension for the measurement of market orientation.

Validity

This study adopted the Gerbing and Anderson (1988) methodology to determine the construct, criterion and discriminant validity of the market orientation measures. This necessitated asking a number of questions about SMCE performance to determine criterion or predictive validity, as there is some empirical evidence which suggests that market orientation should be positively related to performance. Three relative/subjective marketing measures (sales growth, dividend provision, and member satisfaction) were used to provide criterion validity.

Three business philosophy statements used by Kohli et al. (1993) to determine the convergent and discriminant validity of the market orientation measures were also included in the questionnaire. These cover intelligence generation, intelligence dissemination, and responsiveness, with marketing philosophy expected to be more closely associated with the major market orientation measures than other business philosophies.

Discriminant validity is required when evaluating measures (Churchill, 1979), especially when the measures are interrelated, as in the case of intelligence generation, intelligence dissemination, and response.

Analytical Techniques

Before the data were analysed, the questionnaires were reviewed to ensure that appropriate information was being collected and defective questionnaires were discarded. The complete questionnaires were coded and the data keyed into the computer. At this time the LISREL 8.30 was applied to the analysing process and a data analyst was employed to supervise. It was the most important part of the survey. This paper mainly employed three statistical techniques to analyse the SMCE data. They were factor analysis, multiple regression and structural equation modelling (Bollen, 1989; Byrne, 1998; Hulland et al., 1996).

RESULTS

Hypotheses Testing

Assessing fit between model and data

The overall adequacy of the proposed theoretical framework is examined using LISREL 8.30 causal modelling procedures (Joreskog and Sorbom, 1996). A substantial portion of the variance in the market orientation and SMCE performance has been explained by the model. The results are shown in Table 2. The model is a poor fit to the data at χ^2 (203) value of 764.89 (P<0.0000), GFI of 0.71, AGFI of 0.64, and CFI of 0.80. In addition, the squared multiple correlation of structural equations for organizational performance is 0.54. Nevertheless, the fit indices yield information bearing only on the

model's lack of fit; the three hypothesized direct effects are supported significantly at levels of $p < 0.05$ level (Bentler, 1990; Bentler & Bonett, 1980).

Table 2: Estimates of Final Model

Hypothesis	Path		Hypothesized sign	Full sample	
	From	To		Std.	T-value
2	IG	OUT	$\gamma_{11} \neq 0$	-0.32	-3.10
3	ID	OUT	$\gamma_{12} \neq 0$	0.04	0.13
4	RES	OUT	$\gamma_{13} \neq 0$	0.87	2.56
Overall statistics for structural equation:					
			Full sample		
Squared multiple correlation (R^2): OUT			0.54		
Chi square statistic with 203 d.f.			764.89		
Goodness of Fit Index			0.71		
Adjusted Goodness of Fit Index			0.64		
CFI			0.80		

The intelligence generation has its predicted negative relationship (t=-3.10, H2 supported) with performance. The response has its predicted positive relationship (t=-2.56, H4 supported) with performance. However, contrary to my expectation (t=0.13, H2), intelligence dissemination is not related significantly to performance.

Assessing reliability and validity of constructs

In the paper, the composite reliability, variance extracted estimates, convergent validity, and discriminant are examined.

Composite reliability reflects the internal consistency of the indicators measuring a given factor (Fornell and Larcker (1981). The composite reliability values for each market orientation dimension are shown in Table 3. As shown, the composite reliability score for each dimension is relatively high (>.70). In addition, the Cronbach,s alpha values for each of market orientation dimensions are shown in Table 3, which greater than .70(Bagozzi, 1988).

Table 3: Properties of the CFA for the market orientation

Construct indicators	**Standardized loadings**	**t-value**	**Composite reliability**	**Variance extracted estimate**	**Cronbach's Alpha**
Intelligence Generation			0.83	0.45	.85
X1	.45	6.39*			
X 2	.56	10.86*			
X 3	.63	10.90*			
X 4	.52	10.14*			
X 5	.60	11.41*			
X 6	.32	6.49*			
Intelligence Disseminate			0.78	0.48	.85
X 7	.20	4.63*			
X8	.40	10.19*			

X9	.44	11.48*			
X10	.46	13.30*			
Response			0.77	0.33	.70
X 11	.17	3.29*			
X 12	.30	5.58*			
X 13	.35	9.05*			
X 14	.32	8.57*			
X 15	.31	1.36			
X 16	.28	7.38*			
X 17	.49	8.82*			
X 18	.41	10.40*			
X 19	.48	14.02*			

* Indicates significance at p<.01 level

Fornell and Larcker (1981) suggest that variance extracted estimates for the construct is of .50 or larger. The result was that that the variance extracted estimates construct are all a lower than .50. However, very often variance extracted estimates will be below .50, even when reliabilities are acceptable.

Convergent validity is demonstrated when different instruments are used to measure the same construct, and scores from these different instruments are strongly correlated. The convergent validity can be assessed by reviewing the *t*-test for the factor loadings (greater than twice their standard error) (Anderson and Gerbing, 1988)**.** The *t*-test for each indicator loading is shown in Table 3. The result was that the construct demonstrates a high convergent validity because almost t-values are significant at the .01 level (except the R5 indicator).

Table 4: Test of discriminant validity for the market orientation-confidence interval

Dimension	**Estimate**	**Standard Error**	**t-value**	**Lower boundary**	**Higher boundary**
IG-ID	.61	.06	9.67	.49	.73*
IG-Res	.64	.06	11.16	.52	.76*
ID-Res	.92	.03	32.35	.86	.98*

* Does not contain the value 1.0

In addition, the confidence interval test to assess the discriminant validity between 3 factors involves calculating a confidence interval of plus or minus two standard errors around the correlation between the factors, and determines whether this internal includes 1.0. If it does not include 1.0, discriminant validity is demonstrated (Anderson and Gerbing, 1988). Table 4 shows the values of interval between 2 factors. They were 0.73, 0.76 and 0.98. That is to say that discriminant validity for the market orientation scale is supported because no range includes the value 1.0.

Table 5: Test of discriminant validity for the market orientation-extracted variance test

Dimension	**Estimate**	**Square correlation**	**Variance extracted estimate**
IG-ID	.61	.37*	.46
IG-Res	.64	.40	.40
ID-Res	.92	.84	.40

* The square of the correlation is less than both variance extracted estimates

Average variance extracted for each paired dimension is shown in Table 5. The average variance extracted of (0.45+0.48)/2 = 0.46 exceeds the square of the correlation (0.61^2), which suggests that generation and intelligence dissemination are distinct. While the average variance extracted of (0.45+0.33)/2 = 0.40 is below the square of the correlation (0.92^2), this suggests that intelligence dissemination and response are similar. This provides partial support for H1.

Table 6: Test of discriminant validity: χ^2 difference

Dimension	Name	Discriminant model (model 1)	Convergent model (model 2)
IG-ID	χ^2 Degree of freedom (df) χ^2 difference	150.82 34 140.90*	291.72 35
ID-Res	χ^2 Degree of freedom (df) χ^2 difference	251.45 64 7.27*	259.72 65
IG-Res	χ^2 Degree of freedom (df) χ^2 difference	551.24 89 157.13*	708.37 90

* Indicates significance at p<.01 level

The discriminant validity is also tested by setting individual paths of the Phi matrix to one and testing the resultant model against the original model (Cowdhury et al., 1998) using the D-square statistic. The model 1 shows intelligence generation, intelligence dissemination, and response as related but discriminant concepts. χ^2 differences for each paired dimension are shown in Table 6. The χ^2s are 150.82, with a GFI of 0.85 (p<0.000), 7.27, with a GFI of 0.82 (p<.0000) and 157.13, with a GFI of 0.70 (p<0.000). The second model presents intelligence generation, intelligence dissemination, and response as the same constructs with the resulting statistics of χ^2= 291.72 and GFI of 0.75 (p<0.000), χ^2= 259.72 and GFI of 0.81 (p<0.000), and χ^2= 708.37 and GFI of 0.65 (p<0.000). The discriminant model (model 1) has a better fit and indicates that intelligence generation and intelligence dissemination are correlated at 0.61,0.64 and 0.92 respectively supporting H1.

DISCUSSION

Our aim was to examine the market orientation in small and micro community enterprises in Thailand.

The result was that hypothesis 1 is partially supported. It is shown that the market orientation consists of 3 components including the intelligence generation and responsiveness. This finding would be consistent with the research by Caruana (1999); Chelariu et al. (2002) and Verhees and Meulenberg (2004). However, it does not coincide with the studies by Kohli et al. (1993); Kohli and Jarwoski (1990); Pitt et al. (1996); Matsuno et al. (2000), Varela and del Rio (2003), Lafferty and Hult (1999) and Gray, et al. (1998); and Henderson (1998).

The result was that hypothesis 2 is supported. It is shown that the intelligence generation has its predicted negative relationship with performance. This hypothesis confirms the results of Verhees and Meulenberg (2004) and Blankson et al. (2006). But it is contradictory to Mavondo, et al. (2006), Maydeu-Olivares and Lado (2003)'s empirical finding that there is a positive relationship with performance. One explanation for the findings may be that, given the scarcity of financial resources and marketing expertise in an SMCE setting, intelligence generation is perceived as a costly and uncertain undertaking (Chelariu et al., 2002)

In addition, the result was that hypothesis 3 is not supported. It suggests that intelligence dissemination is not linked to the organizational performance of a community enterprise. This hypothesis is contrary to the finding by Kohli et al. (1993); Kohli and Jarwoski (1990). The rationale of this finding might be that the relatively small size of SMCE makes diffusion of information less problematic. Nevertheless, this finding would be consistent with the research by Caruana (1999); Chelariu et al. (2002).

The result was also that hypothesis 4 is supported. It is indicated that in SMCEs, responsiveness has a positive relationship with performance. This finding confirms most previous studies by Kohli et al. (1993); Shoham et al. (2005); Sin et al. (2003); Green, et al (2005); and Untachai (2007).

Research and Managerial Implications

For the researcher, this study has implications on the examination of the link between the market orientation and performance. Firstly, this paper provides a test of the applicability of the western paradigm to the Thai economy with cultural and economic systems different from the US.

My paper validates Kohli et al. (1993)' s market orientation scales in a Thai context based on data obtained from the members of Thai SMCEs. Though this scale was originally developed in the US. for the SBU level, findings suggest that the scale appears to be less likely to capture the construct of market orientation in Thailand with different economic and cultural environments. It might be risky to conclude that Kohli et al.' s market orientation scale is a valid and reliable scale that can be used across a variety of companies, industries and cultures.

Secondly, the market orientation related to performance. It might be concluded that the link can be tested in other sectors such as retailing and hotel.

For a managerial perspective, an entrepreneur who implements strategies in different environment settings cannot have an ethnocentric view about management imperatives. This study provides some guidelines for entrepreneurs handling market orientation across the country. For example, the result of the study demonstrates that intelligence generation has a negative link to performance. The entrepreneur in a Thai SMCE should have a marketing manager for continuously monitoring customer needs and competitors' strategies to propose integrated marketing strategies in a timely manner in the market. Subsequently, the study found a non-significant link between intelligence dissemination and performance. Thus, SMCEs should increase communication channels, or develop a means for distributing customer and competitor intelligences to their members. It might be collaborated among Thailand officials, such as Department of Agricultural Extension, Community Development Department and Commission on Higher Education. However, this study found that responsiveness is strongly related to performance. The SMCEs should place emphasis on customer care, concern for employees and members' welfare, have reliance on intuition and awareness of the competitive and technological environments.

In summary, despite a lack of a formal approach to market research and marketing planning, the SMCEs were found to have a positive effect on their margins.

Limitations and Future Research

Although this paper has provided relevant and interesting insights into the understanding of the components of market orientation structure and the relationship between market orientation and performance in Thai SMCEs, it be clearly recognizes the limitations associated with this study. First, cross-sectional data were used in the paper. Subsequently, the time sequence of the relationships between market orientation and performance cannot be determined unambiguously. Therefore, the results might not be interpreted as proof of a causal relationship, but rather as lending support for a

prior causal scheme. The development of a time-series database and testing of the market orientation relationship with performance in a longitudinal framework would provide more insight into probable causation.

Second, the conceptualization of market orientation may be somewhat limited and it is arguable that market orientation may consist of more than market information gathering, and the development and implementation of a market-oriented strategy.

Third, the LISREL methodology may be construed as a limitation because the results presented here are based on the analysis of a causal non-experiment design.

CONCLUSION

The purpose of this study is to examine the causal relationship between intelligence generations, intelligence dissemination, organizational responsiveness and the performance of the community enterprise network in the upper Northeast of Thailand.

Three out of the four hypotheses have been supported in this study. Consistent with the first hypothesis, the market orientation consists of intelligence generations and organizational responsiveness. The second hypothesis reveals that the intelligence generation has its predicted negative relationship with performance. One explanation for the findings may be that, given the scarcity of financial resources and marketing expertise in a developing economy, intelligence generation is perceived as a costly and uncertain undertaking (Chelariu et al., 2002). Hypothesis three is not supported. In short intelligence dissemination does not relate to organizational performance of community enterprise's network in the upper Northeast of Thailand. Finally, the fourth hypothesis also supported the view that there is a causal relationship between organizational responsiveness and the performance of the community enterprise network in the upper Northeast of Thailand.

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Web-based Courses to Support EFL Learning for Pre-service Teachers: A Thai Pilot Study

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ABSTRACT

In a modern, information rich, economically driven society, Western universities as well as Thai Universities are turning towards the Web to disseminate and retrieve information. Integration of computers to support the learning environment in teaching language is still in its infancy in Thailand. Its implementation changes both the instructional strategy and also the teaching and learning environment.

English has been taught as a foreign language for over a century, and plays an important role at all levels of the Thai education system. At higher education levels, English skills are essential components of every pre-service teacher's professional education. In order to maximise opportunities for future teachers to develop their English skills, the teaching and learning of these skills has blended with the utilisation of ICT in many developed and developing countries.

This paper describes research that developed a computer-supported EFL course as a new learning model for EFL curricula and practice. The context for the study, was the development of a web based course to support pre-service teachers' professional knowledge and skills in English, set in a Rajabhat University in Thailand. Results from the multi-method approach used highlighted the possible contribution of ICT use in EFL classroom teaching and learning.

Keywords: Evaluation of a web-based course, Pedagogical strategy, Applications in EFL teaching and learning, Interactive EFL learning environment

INTRODUCTION

This paper is based upon part of the work that forms a much larger doctoral study. It describes the development and evaluation of a pilot web-based course that was developed to be used as a tool to support English as a Foreign Language (EFL) teaching and learning for pre-service teachers in Rajabhat universities in Thailand. It is hoped that further development of this course will lead to a web-based English language training system that will provide an enhanced preparation pre-service teachers for learning effective language and computer skills.

As in all modern, information rich, economically driven societies, Thai Universities are turning towards ICT to disseminate and retrieve information (Bash, 2005; Chansilp, 2003; Neo, 2004; Shannon & Doube, 2004; Thongprasert, 2003). This includes the integration of computers into language teaching to support the language learning environment as an instructional strategy (Lo, Wang, & Yeh, 2004; Neo, 2004; Souza & Fardon, 2002; Tse-Kian, 2003; Wattanaboot, 2003). Thus

the traditional teacher-centred method of teaching has been modified and enhanced. The challenge is how to best facilitate effective teaching and learning as well as restructure curriculum to meet the rising demands of the knowledge based society that Thailand aims to become (Hepp, Hinostroza, & Laval, 2004, p. 299; MOE, 2007; ONEC, 1999; Ping, Swe, Hew, Wong, & Shanti, 2003; UNESCO, 2006).

Rajabhat Universities located around the country, are well positioned to cater to the educational requirements of a wide section of the population. One of the underlying philosophy of Rajabhat Universities is not only to promote the academic and professional status of teachers and educational personnel but also to apply advanced technologies to enhance instruction and improve efficiency. Until recently pre-service teachers in Rajabhat have had limited and basic computer experience. This experience has often been limited to performing fundamental tasks such as word processing (Wattanaboot, 2003). As many university students are now quite familiar with new technology, especially computer usage, it is appropriate that computer-based learning environments become practical in their application. Much research has shown that learners need to have "both a concrete and abstract knowledge of computers and need to be able to apply their knowledge to new systems and new situations with minimum retraining" (Winter, Chudoba, & Gutek, 1997). Thus, the needs of the university are to provide online courses that serve differing pedagogical approaches.

This paper describes a study that examined how a web-based course might be used as a tool to support English as a Foreign Language (EFL) teaching and learning for pre-service teachers in Rajabhat universities in Thailand. A further development of this web-based course will hopefully enable learners gain access to an increase range of online course for tertiary education students' opportunities. It is also a web-based English language course to advance pre-service teachers' preparation for effective language and computer skills for future teachers.

METHODOLOGY

The aim of the study was to design and to evaluate a web-based course and determine its usefulness for pre-service teachers in Rajabhat Universities.

Design of the Pilot Course

The pilot web-based course was intended not to be a separate system but more a "portal" into the university's network. Thus the course contains background information from the universities existing computer-based environment. These include FAQs, basic computer knowledge, lesson plans and step by step self interactive computer-based lessons. These link up existing information structures, and so generate savings in the time and cost of information production. The information provided was designed to be relevant to university students and teachers of EFL, and also provides for easier accessibility for students both on and off campus. The course attempted to engage the students' interest by organising and presenting the information in real life situations. The interface and contents are designed to be easily to use. The course intends to be fun and easy by not involving lengthy instruction without interaction. It also provides information via audiovisual means using the image and voice of a native speaker to help gain listening competence. Social activities and other interactive information help encourage more collaboration and cooperation at a recreational level. The graphic style and content used was targeted towards the age group (18-23 years old), as much as possible by using both in colour and content.

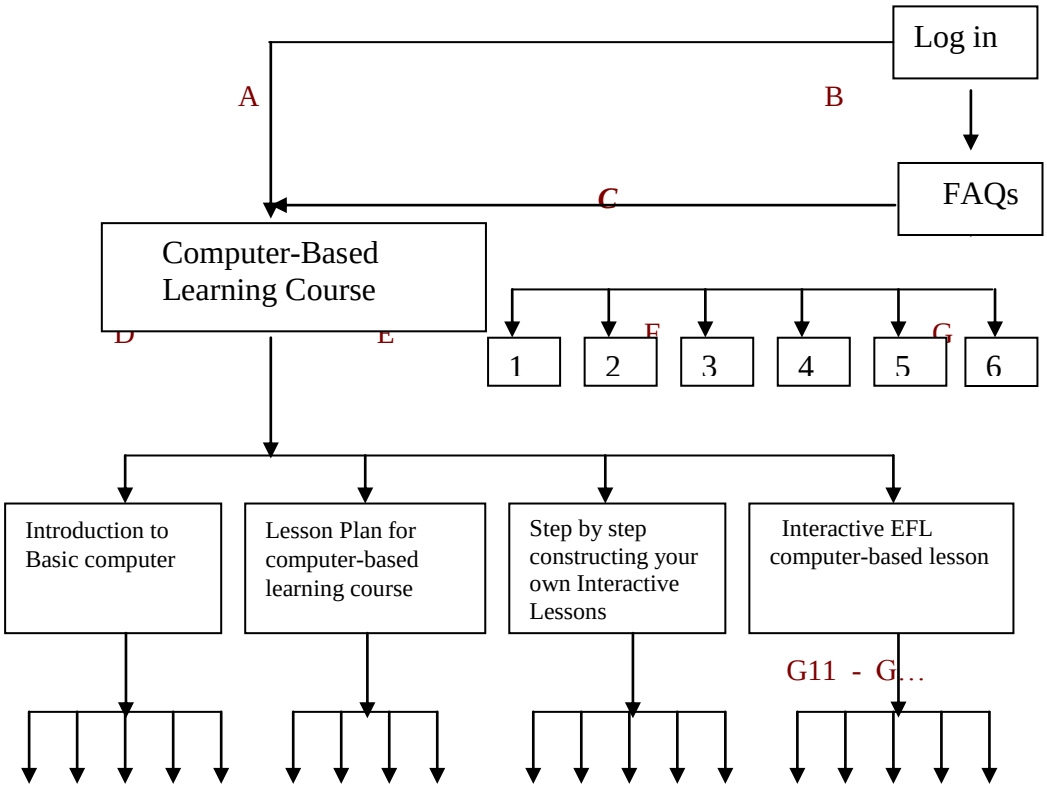


Figure 1: A Flowchart of the Web-Based Course

The web-based course was designed for easy navigation, as shown in the flowchart (Figure 1). The first level entry layout accesses the entire web-based course (A) as well as a Frequently Asked Questions (FAQ) section (B) that gives access to any relevant information (C). The third level (D, E, and F) links to existing information in the computer-based learning environment course. The initial item encountered on the computer-based learning course is a log in with a soundtrack to gain the attention of the users; vibrant colours are employed to attract attention (Figure 2).

Figure 2: Screen Shots of the Flash Animated Introduction Sequence

Figure 3: Screen of a Main Menu (Level 2)

The main menu screen (Figure 3) uses pictorial links to various sections of the course (A). There is "one-click" access to other sections available from a navigation bar at the top of each screen (Figure 3). Navigation bars are located at the top of each computer-based lesson environment course screen. The FAQ section (B) links to Course main menu (A) as well as University Main menu provides access to the main streams of information and is presented in a non-linear format (Figure 4). The information is divided into the framework of "who, why, what, where, when and how". The contextual links are provided to navigate to appropriate content on the main menu. The users are also allowed to post and share their experiences and/or problems or other relevant information. These sections are provided to be available when needed to provide answers to questions, or to offer further contact advice. A further aim of these sections is to support communication within the learning community.

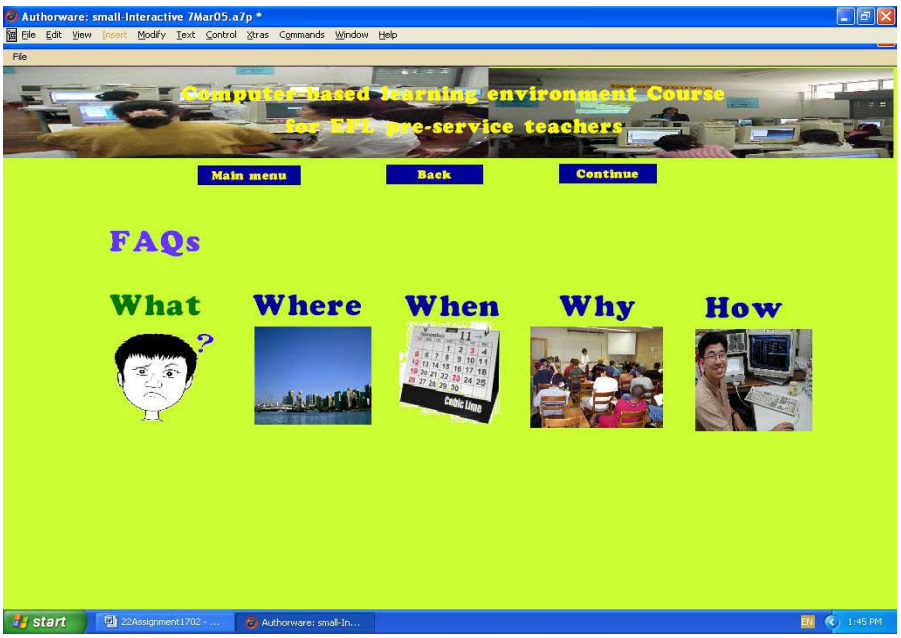


Figure 4: Frequently Asked Questions (FAQ) Section (Level 2)

The users access the 'Introduction to basic computer' section (D) to gain support with basic computer skills. The users then have a chance to learn how to navigate through audiovisual materials and content (Figure 5).

Figure 5: The Introduction to Computer Section

The following section is shown when you click on the Lesson Plan of computer-based learning environment course on Course Main menu (Level 2).

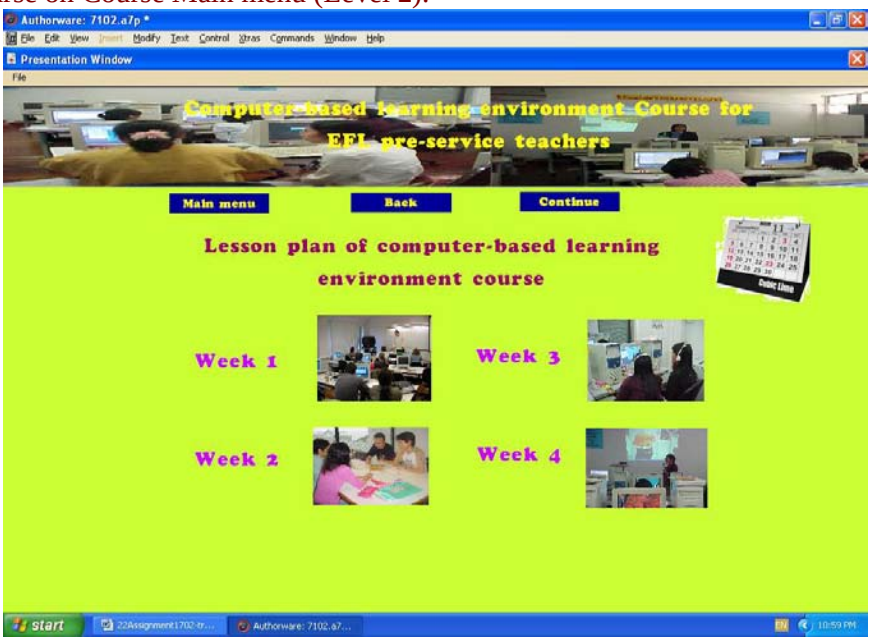


Figure 6: The Lesson Plan Section

Part of the intended EFL training methodology was to use a computer Authoring environment to allow the acquisition of English language skills within a realistic context. The environment chosen was Authorware, chosen because of its both language and iconic driven interface and its availability within many Rajabhat universities. Its intended application within the EFL training classroom is described below.

- The first week pre-service teachers will be informed about general basic computer use, including keyboards and general computer technical terms. Authorware function keys will also be presented. They will be allowed to practice using different function keys of Authorware step by step.
- The second week pre-service teachers will retrieve the chosen contents of prepositions of place, location, date and time. The storyboard will be written and share among group and pair work. The instructor and peers will give comments and feedback.
- The third week pre-service teachers will create and present their own work. They are allowed to observe and consulted their peers or instructor anytime.
- The final week, pre-service teachers will present their work and give comments and feedback about their peers' work. Then they will edit their work and package it onto a CD-ROM.

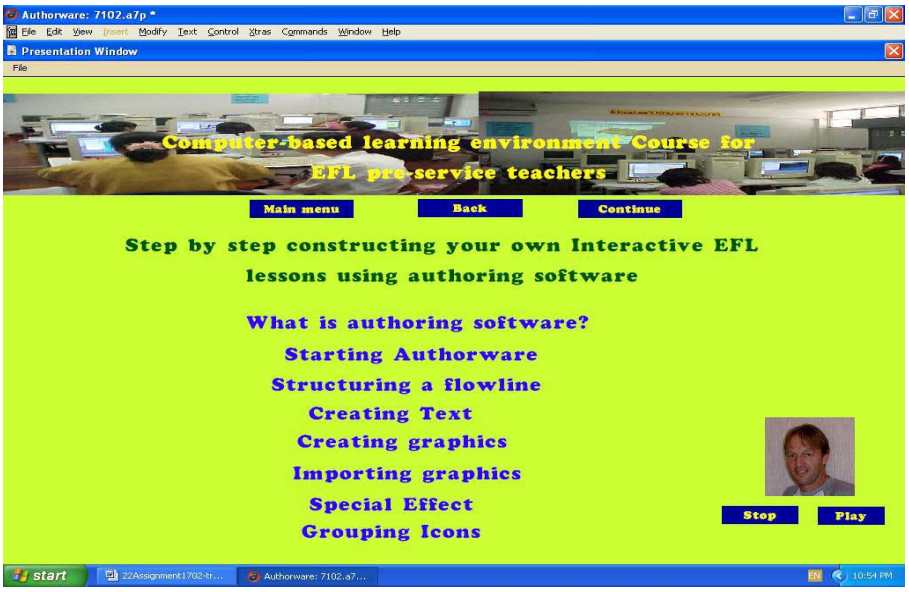


Figure 7: The Section of Step by Step Constructing the Users' Own Interactive EFL Lessons

Within a mouse click on the highlighted area (G) accesses to information about using authoring software (G). The audiovisual will inform how to use authoring software step by step (Figure 7). Within one click on Interactive computer-based Lessons (F) providing in grammatical section e.g. prepositions, the students learns and practising the sample of grammar structure concerning prepositions (Figure 8).

Figure 8: The Section of Interactive EFL Computer-Based Lessons

EVALUATION

Instruments

In order to formally evaluate the pilot course a set of internationally recognised software evaluation tools developed by Professor Thomas Reeves were used. Reeves' evaluation tools provide 20 criteria or pedagogical dimensions for evaluating the educational aspects of any software. The criteria include; the design of the interface, pedagogy philosophy and psychological theory, instructional sequencing, the role of errors and the teacher/trainer, learner control, and cooperative learning (Tom Reeves, 1997). In addition, Bates (2000) believes that seven factors need to be considered in evaluating the effectiveness of different instructional technologies: online course access and flexibility; cost; teaching and learning; interactivity and user friendliness; organisational issues; novelty; and speed. Further evaluation criteria relevant to courses and programs delivered in the World Wide Web. The considerations include class size, synchronous and asynchronous activities, instructor response time, ease of navigation, and opportunities to interact with peers and the instructor (Cyrs, 2001). In addition, a checklist of critical elements characterising effective learning environment in three man categories are offered to evaluate online course: (1) Pedagogies, the learning activities which underpin the unit; (2) Resources, the content and information which are provided for the learner; and (3) Delivery strategies, is associated with the ways in which the course is delivered to the learners (Herrington, Herrington, Oliver, & Willis, 2001). The evaluation strategy takes all of the above into account in providing recommendations for further development of the course.

In order to evaluate the development of the pilot web-based course that was designed to support EFL teaching and to evaluate its effectiveness, questionnaires were administered to experts, educators and students who had reviewed the course. The data obtained from responses concerning attributes of engagement and attraction were analysed. Questions (Likert scale based) sought the viewers' opinions and impressions towards the interface and content. The results are to help develop the online course.

The researchers used a set of internationally recognised software evaluation tools and constructs including:

- Professor Thomas Reeves' evaluation tools (T Reeves, 1997), provide criteria for evaluating the educational aspects of software. The criteria include; the design of the interface, and pedagogy Questionnaires with both open-ended and close-ended for teachers
- Questionnaire for administrators
- Questionnaire and Interviews for participating pre-service teachers

Participants

The participants were administered to reflect on the course and examine whether the web-based course is useful for EFL teaching and learning. They were:

- Three educators
- 10 Pre-service teachers
- 10 EFL teachers
- Six Administrators

REFLECTIONS FROM REEVES' EVALUATION

In this paper, the results from the questionnaire of three educators based on Reeves' Interface and Pedagogical Dimensions will be discussed along with the overall conclusions from the evaluation

process. In the Reeves' evaluation process, participants rated each criterion on a 5-point Likert scale from Strongly Disagree (1) to Strongly Agree (5). A rating identified the participants' opinion of the designed web-based course. The overall summary of these findings is discussed below.

Interface Evaluation

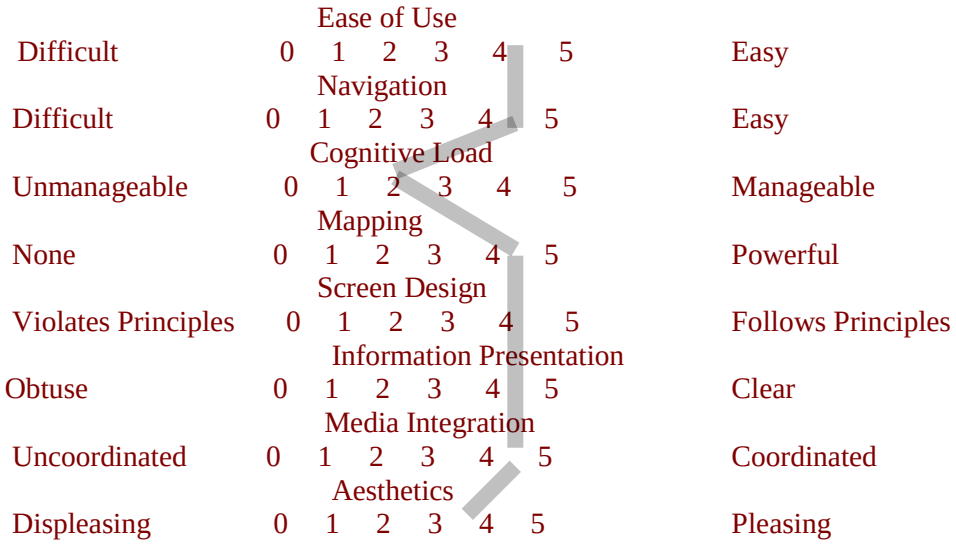


Figure 9: Interface Design Dimensions

This web site is easy to use as there are no complicated functions or navigation (M=5). The participants found that it is a strong feature of this web site. The links and formats support beginners as well as advanced users.

Navigation is linear so it is extremely easy to operate and know where the user is in the program and how to go to another section (M=5). The navigators appear on fixed areas on the screen.
The information seems to be easily accessible. Some physical activities provided on the quizzes can be handled by the mouse pointer. The cognitive load of this web site seems easily manageable. The mean score (M=3) is ranked as medium.

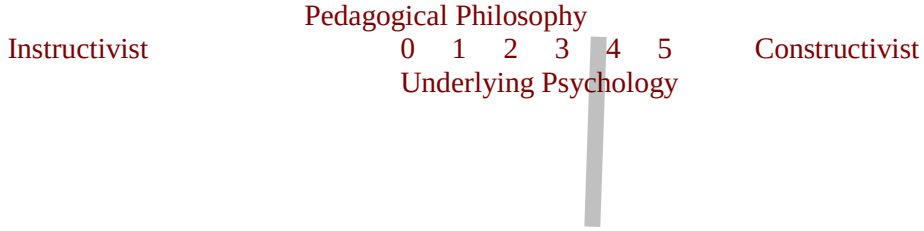
The web site provides a mapping system to track the information the user has accessed or interacted with. This web site is given the highest mean score for its powerful mapping function (M=5).
Icons, graphics, colour and other visual designed in this web site are ranked with the highest score (M=5). The light green background of the screen is comfortable to the eyes. The animation provided in each page is enough to engage the intended audience.

Information in the web site is presented in a comprehensible form (M=5). The hyperlinks help the user learn and understand the information. The language used is simple for intended users. Some hyperlinks provided help to trace related information.

There is adequate media integration throughout the designed web. From the highest rated mean score (M=5) given it can be assumed that an audiovisual integral helps to attract and engage the intended learners.

The aesthetics is pleasing (M=4).

Pedagogical Evaluation



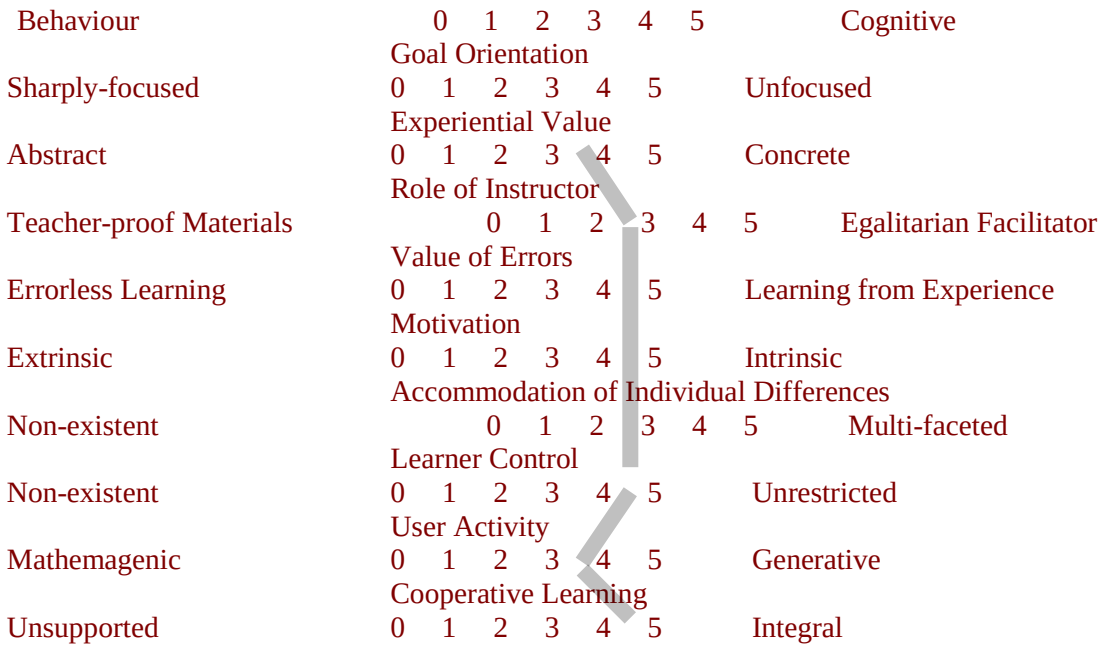


Figure 10: Pedagogical Dimensions

This web site attempts to present comprehensive knowledge using a constructivist approach (M=4). In the interactive sections, for example, quizzes containing prompt feedback can be seen involving individual motivation, experience, and learning styles to construct knowledge.

The underlying psychology falls into behaviour learning theory and cognitive learning theory and constructivism (M=4). This web site supports behaviour learning theory in terms of responses, feedback and reinforcement. The website acts as a tutor presenting information. The user, then, is set to respond to questions provided at the end of a section. In addition, the set criteria will evaluate the user's responses. The learner also has multiple opportunities to practise and provide the correct answer.

Social interaction with others via discussion board also supports a cognitive development which is one of the key principles of constructivism. This web site allows learners to handle their learning themselves. 'Learning by doing' is central to constructivism in practice as well (M=5).

The web site allows learners to learn from their experience on the 'wrong' trial in quizzes' section (M=5). The learners may click on the responses randomly and feedback will be provided at the end of the quiz. This process encourages the user by providing a challenge to find the correct response.
Limited teachers' and trainers' direction is required in this web site (M=5). However, if included in a classroom setting, it would provide cooperative learning or collaborative learning strategies with appropriate teacher guidance. Participants comment that some translation should be provided for EFL learners.

This web site fosters individual differences as the accessibility allows learners to achieve their own goal supporting different learning styles (M=5). This web site rates the highest mean score when measuring potential accommodation of individual differences.

This web site allows learners' freedom to direct their required contents by simple navigation (M=5). Contexts are useful and informative. The animations and audiovisual effects could contribute towards making the lessons more interesting, which in turn could assist in maintaining individual motivation and engagement.

The participants' gave a mean rating between 4 and 5 on a 5-point scale. Based on the ratings given, participants perceived the web site to be an effective instructional web-course. Overall the web site was perceived to be useful for teaching and learning how to construct an interactive English lesson. It is ranked in the highest mean score related to the target audience. However, the content should be adjusted to suit EFL learners. For example, there could be some translations included.

REFLECTIONS FROM THE QUESTIONNAIRE

Teacher

In order to ensure that the course materials would prepare EFL pre-service teachers for academic success and the future workplace, data about the course structure/content were collected from a survey of EFL teachers' opinions about the computer-supported EFL course. The results showed that overall, teachers' responses tended to be positive regarding the new computer-supported EFL course. Six of the EFL teachers responded in the survey that English teaching and learning through computer use is a critical priority. Five out of ten EFL teachers agreed that the course should be taught to improve students' English language skills for all enrolled students.

Administrators

Data were collected from administrators who were based at six Rajabhat Universities. The survey showed that most administrators agreed that the course was an appropriate teaching and learning tool to support EFL learning. For example, most administrators agreed that the course engaged learners in skills and teaching strategy - collaborative learning areas. In addition, most administrators agreed that the course tends to transfer the traditional teaching approach to a learner-centred approach.

Pre-service teachers

The pre-service teachers' opinions about the course structure/content were collected. The results showed that most EFL pre-service teachers agreed or strongly agreed with the statements. The overall results suggested that the pre-service teachers perceived that the course was an appropriate instructional support for English language and computer skills. The most important results for EFL pre-service teachers in Thailand are that the computer-EFL supported course is perceived to provide opportunity to develop English language skills and give good computer skills support.

RECOMMENDATIONS

The researcher has a number of recommendations for further research includes these possibilities:
The suggestion for future research is that the inclusion of examples of the actual interaction during the intervention can support further analysis of the data.

The introduction of a computer-supported EFL course should be taken into account for future research if the intervention is placed in a classroom setting, as some resistance to using computers might discourage learners' motivation and interest. Further to this, the students' and teachers' attitudes towards the use of computers in the classroom setting also need to be explored, evaluated and followed up to maintain their computer competence.

There were a number of limitations that need to be considered in interpreting the findings of this initiative study. A more comprehensive investigation including a large number participants and participants from other disciplines would contribute a better understanding. Further research would be essential to evaluate the effectiveness of the course.

CONCLUSION

While based on the responses given, participants perceived the online learning system to be an effective instructional web-course; the development and evaluation process did reveal some issues that need to be taken into account in the design of the full online version. Some of these issues relate to access, to design and others to learning styles. Thailand has great variations of ICT and online access this means that students using any online learning system often have great variations in ICT skill levels. Also as bandwidth and internet access for students is very variable beyond campus boundaries the online course may only be effective when used on campus. Accommodating this diverse range of learners is imperative as courses move online. The researchers feel that with the move to online learning we have gained an incredible ability to give students a new way of learning that is very flexible but the use of such system still requires access to human teacher who can adapt to their students' needs. Thus the prototype has revealed the need to design the pedagogy as a complete system that includes the learner, the teacher, learner environment and the online learning system.
It is hoped that by understanding the limitations of the current system, the designer can make the best use of limited resources available when advising upon the development of the full system, without alienating students or shutting them out by the use of resources too media rich to be viewed on the computers available. The materials can then be designed around the learners needs, rather than round the needs and limitations of the technology.

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Implementation of Generic Skills in the Curriculum

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ABSTRACT

In many cultures and countries including Malaysia, the issue of incorporating generic skills into the curriculum taught to students in higher learning institutions has gained momentum in recent years. The raison d'être to inculcate generic skills among students is to enable the country to meet human resource requirements which will be more competitive in the advent of a borderless world. Growing concerns of the employability of graduates and the expansion in the size and diversity of student populations also form the basis to implement the generic skills program in universities. All undergraduate programs offered in public higher learning institutions in Malaysia are now required to incorporate generic skills in the curricula. This generic skill requirement is subject to reviews when programs are accredited and rated for quality assurance by the Ministry of Higher Education. In order to satisfy this requirement, Universiti Malaysia Terengganu (UMT) as a new university has been proactive in redesigning the existing curriculum to be more competitive and marketable by integrating and implementing generic skills in the curriculum. This paper will discuss the approaches taken by UMT in integrating elements of generic skills in the teaching and learning activities. The experiences and challenges in the planning, implementing and assessing generic skills components are also elaborated. Finally, this paper ends with suggestions and recommendations with respect to further initiatives to enhance the employability of the graduates.

Keywords : generic skills, employability, curriculum, teaching and learning

INTRODUCTION

The issue of employability of graduates has become very serious and critical in many countries including Malaysia. The biggest challenge facing institutions of higher learning (IHL) is to develop employable skills, enhance knowledge and make local graduates more attractive to employers. Both local and global workplaces are demanding workers that are able to transform knowledge and skills learnt into successful workplace performance. Evidence from surveys suggested that employers are more concerned about soft skills or attitudes rather than technical knowledge or competencies. Empirical studies on work found soft skills such as leadership, communication, team building and entrepreneurial interest have become critical for hiring and promoting employees to key positions (Audibert and Jones, 2002). A study done by Evers, Rush, and Berdow (1998) indicated that the competencies students need to develop in order to enhance their employability are self-management; communications; managing people and tasks; and mobilizing innovation and change. In a survey of 400 employers on their perception of workplace basic skills and competencies required for current and potential employees, the employers said that they want entry-level workers to possess employability skills rather than technology competencies, and the most important to these employers (rating over 92.6%) were basic skills, thinking skills, personal quality skills, and interpersonal competencies (Richens and McClain 2000).

According to Wilhelm (2002), employers assert that too many high school and college graduates do not possess the skills necessary to contribute productively in their jobs without extensive employer training. Soft skills are important in virtually every profession especially when one has reached the level of sales manager or agency owner, working with and through others. Therefore, when evaluating candidates, organizations will look for someone who has good people skills and is a team player. Somerset (2001) and Bunker and Wakefield (2004) stressed the importance of soft skills in contributing to organizational success in the workplace for an employee, manager or leader. Those who aspire to become leaders are not likely to succeed without highly developed skills in these areas. Being a leader, proficiency in soft skills is critical. To be an effective leader, thinking systemically and acting strategically is very important, but superb soft skills are necessary to enable one to articulate a vision; to enrol others in possibilities; and to communicate values, standards, and expectations. Muir (2004) found that soft skills are the essential tools enabling employees to contribute to their fullest potential.

At the same time, economic and social changes are modifying and upgrading the profile of basic skills that everyone should have as a minimum entitlement, enabling active participation in working life, family life and all levels of community life. In the process of improving and upgrading the quality of students, institutions of higher learning are required to consider a better and improved curriculum in order to produce students of strong motivation and capabilities upon graduation. These challenges are not any different for a country like Malaysia and among the challenges faced by IHL in Malaysia are: globalization of education; competition; k-economy; sustainable development of human capital; quality assurance; value added and cross border education. This paper will discuss the approaches taken by UMT in integrating elements of generic skills in the teaching and learning activities. The experiences and challenges in the planning, implementing and assessing generic skills components are also elaborated. Finally, this paper ends with suggestions and recommendations with respect to further initiatives to enhance the employability of the graduates.

DEFINING GENERIC SKILLS

Generic skills are also known by many other terms such as soft skills, key skills, common skills, essential skills, employability skills, basic skills, necessary skills, competencies skills, and transferable skills. Nabi and Bagley (1998), have divided the generic skills into three categories which are personal skills, communication skills, and problem solving skills. Bennett, Dunne and Carre (2000) have reported based on their research findings that generic skills can be presented in four broad areas of management skills namely management of self, management of others, management of task, and management of information. Crosbie (2005) had listed the eight soft skills that are needed by all individuals: collaboration/teamwork, communication skills, initiative, leadership ability, people development/coaching, personal effectiveness/personal mastery, planning and organizing, and presentation skills.

A recent effort to come up with a competence-based and multidimensional operationalization and measurement of employability from a career perspective was undertaken by Van der Heijde and Van der Heijden (2006) who have studied employees in their organizational context. They define employability as “the continuous fulfilling, acquiring or creating of work through the optimal use of competencies”. The authors have developed a measurement instrument, in which occupational expertise is complemented with four more transferable competencies. They propose four generic dimensions: Anticipation and optimization, Personal flexibility, Corporate sense, and Balance, as important distinguishing and complementing components of employability for individual employees. According to NCVER (2003), the list of generic skills has six common elements namely, basic fundamental skills, people related skills, conceptual/thinking skills, personal skills, skills related to business world, and skills related to community.

Soft skills are identified to be the most critical skill in the current global job market especially in this fast moving era of technology ((Ministry of Higher Education, Malaysia, 2006). From the reviews of

literature in other countries, the Malaysian Ministry of Higher Education has developed the soft skills module that was introduced to the public universities in 2007. The former higher education minister, Datuk Mustapa Mohamed has said that the module was introduced after taking into consideration complaints from employers that local graduates lacked soft skills.

"We take these views seriously, which is why we are introducing this new module for the new 2006/07 intake... My mission is to ensure our graduates have the necessary skills."

The module highlighted seven elements of generic skills that need to be incorporated into the curriculum namely communication skill; critical thinking and problem solving; teamwork; lifelong learning and information management; ethics and professional moral; entrepreneurship; and leadership skill.

A BRIEF BACKGROUND ON THE MALAYSIAN UNIVERSITY SYSTEM AND UNIVERSITY MALAYSIA TERENGGANU

The Ministry of Higher Education was established on 27 March 2004. The Malaysian Ministry of Higher Education is comprised of two departments and an agency. The departments are the Higher Education Management Department (JPIPT) and the Polytechnic and Community College Management Department. The JPIPT is further subdivided into two management sectors that are the IPTA (or public universities) Management Sector and the IPTS (or private universities) Management Sector. In order to enhance the academic quality in the universities, the Malaysian Qualifications Agency (MQA), was established on 1 November 2007 with the coming in force of the Malaysian Qualifications Agency Act 2007.

The main role of the MQA is to implement the Malaysian Qualifications Framework (MQF) as the basis for quality assurance of higher education and as the reference point for the criteria and standards for national qualifications. MQF is an instrument that develops and classifies qualifications based on a set of criteria that are approved nationally and benchmarked against international best practices. It also clarifies the earned academic levels, learning outcomes of study areas and credit system based on student academic load. These criteria are accepted and used for all qualifications awarded by recognized higher education providers. MQF also has given emphasis to learning outcomes of study areas namely knowledge, psychomotor/practical/technical skills, social skills & responsibility, professionalism, values, attitudes, ethics, communication and team skills, critical thinking & scientific approach, managerial & entrepreneurial skills, life long learning and information management

Currently there are 22 Public Institutions of Higher Learning in Malaysia. University Malaysia Terengganu (UMT) is the 14th public university in Malaysia. Its location at Mengabang Telipot, Kuala Terengganu is along the coast of South China Sea and this makes UMT an ideal maritime university. UMT was formerly known as KUSTEM (University College of Science and Technology) and the university's research focus is on oceanography, marine biotechnology, aquaculture and island and peripheral community development. UMT's research undertakings have been acknowledged universally by different bodies as evidenced by outstanding research achievements and recognitions, recorded both at national and international research exhibitions and competitions. To date, UMT has four faculties and three institutes namely, the Faculty of Science & Technology, Faculty of Agrotechnology and Food Science, Faculty of Management and Economics, Faculty of Marine Science and Maritime Studies, Institute of Tropical Aquaculture, Institute of Oceanography and Institute of Marine Biotechnology. UMT offers 24 undergraduate programs to about 6000 students from all over the country.

CURRICULUM DEVELOPMENT STRUCTURE IN UNIVERSITY MALAYSIA TERENGGANU (UMT)

Curriculum development is one of the key factors related to meaningful and successful program improvement. Curriculum development can be defined as the systematic planning of what is taught and learned in university as reflected in courses of study and university programs. These curricula are embodied in official documents (typically curriculum "guides" for lecturers) and diligently being implemented by each academic department. The development of curriculum structure in UMT is based on Ritz's Model which have three stages, firstly curriculum foundation, curriculum content, and curriculum evaluation (Diagram 1). UMT has taken a proactive strategy based on the unemployment studies and reports available by undertaking their first curriculum revision. The revised curriculum was implemented in the May 2003/2004 session and the main focus and priority was on integrating generic skills in all the courses for each of the programs offered by the university. Lecturers were asked to incorporate generic skills in their teaching content. The revision of curriculum created awareness and provided the guidelines for academic staff to implement generic skills in their teaching and thus enhance the learning process of the students.

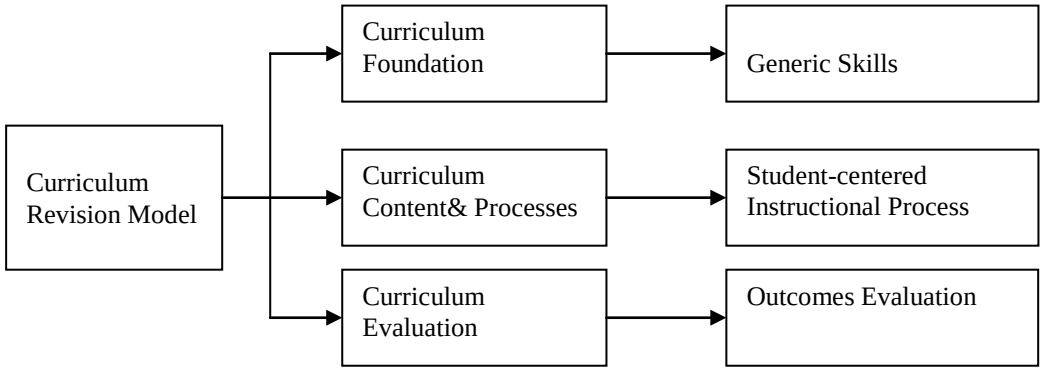


Diagram 1: Curriculum Revision Process in UMT

- Curriculum foundation

Curriculum foundations are the components that influence and control the content and organization of the curriculum. They are based upon values one has developed pertaining to knowledge, society, learning, and the individual. Such components as definition of the program area, rationale for the study of the program area, content source, content structure, program aim, and program goals are included in the curriculum foundations.

With regards to the national unemployment report and studies carried out elsewhere, UMT has identified the elements of generic skills such as communication, languages, analytical thinking, learning to learn, information communication technology (ICT), numerical competency, entrepreneurship and character building to be inculcated to the students through the integration of these skills across the curriculum. The importance of some of these skills are also documented in the Code of Practice for Quality Assurance in Public Universities of Malaysia document, which states that the quality of a university program is assessed by the ability of graduates to carry out their expected roles and responsibilities within the society (Aida Suraya, 2005). Thus, based on the report from the Quality Assurance Division (2004), students should be able to demonstrate the following generic skills by the end of their programs: critical thinking, problem solving, creative decision making, and the ability to communicate.

- Curriculum content

Curriculum content is the second major category of curricular elements. It includes the knowledge, skills, and attitudes (values) which educators are interested in conveying to learners. As the

foundations of the curriculum determine what and why to teach, the content focuses upon the specific information to be transmitted and the means of transmission. In this category are the scope, sequence and unit specifications. The unit specifications may be further divided into goals, rationales, objectives, activities, and references. In all, the content elements provide direction for organizing curriculum content and for transmitting it to learners. Student-centered is an approach to education focusing on the needs of the students, rather than those of others involved in the educational process, such as teachers and administrators. This approach has many implications for the design of curriculum, course content, and interactivity of courses.

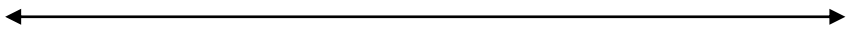
To illustrate how UMT integrates generic skills in the curriculum content, the following discussion will be focused on the Bachelor of Accounting program. Table 1 shows the mapping of generic skills under the Bachelor of Accounting program after taking into consideration the generic skills (GS) matrices during the four years of study. The program adopted the following steps in mapping out the course objectives in line with the GS:

Table 1: Incorporating the Generic Skills by the year of study

Generic skills	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Communication (GS1)	****	****	***	***
Language Proficiency (GS2)	****	****	***	***
ICT (GS3)	**	***	****	****
Analytical (GS4)	**	***	***	****
Learning to learn (GS5)	****	****	***	**
Numeracy (GS6)	***	***	**	**
Entrepreneurship (GS7)	*	*	**	***

Note:

* ***



Least emphasis greatest emphasis

A summary of GS incorporating all the learning objectives within the Bachelor of Accounting program is shown in Table 2.

Table 2: Incorporating GS in the Bachelor of Accounting Program

	GS 1	GS 2	GS 3	GS 4	GS 5	GS 6	GS 7
Year1:							
AKN 3101 Basic Accounting	X	X			X	X	
AKN 3102 Intermediate Financial Accounting I	X	X			X	X	
Year2:							
AKN 3801 Quantitative Techniques	X	X	X	X		X	
AKN 3601 Financial Management	X	X		X		X	X
AKN 3201 Management Accounting I	X	X			X	X	
AKN 3103 Intermediate Financial Accounting II	X	X	X	X		X	
AKN 3202 Management Accounting II	X	X	X	X		X	X

	GS 1	GS 2	GS 3	GS 4	GS 5	GS 6	GS 7
AKN 3401 Taxation I					X	X	
AKN 3104 Advanced Financial Accounting I			X	X	X	X	X
Year3:							
AKN 4402 Taxation II			X	X		X	
AKN 4501 Accounting Information System			X	X			X
AKN 4105 Advanced Financial Accounting II			X	X		X	X
AKN 4301 Audit I	X	X			X		
AKN 4802 Company Secretarial Practices	X	X			X		
AKN 4602 Corporate Finance	X	X	X	X		X	X
AKN 4403 Advanced Taxation			X	X		X	X
AKN 4302 Audit II			X	X		X	X
AKN 4106 Accounting Theories and Practices	X	X			X		X
AKN 4107 Public Services Accounting	X	X			X		
AKN 4203 Management Accounting III			X	X		X	X
AKN 4999A Project Paper I	X	X	X	X		X	X
Year4:							
AKN 4108 Current Issues on Accounting and Audit			X	X			
AKN 4803 Business Ethics	X	X	X	X			X
AKN 4999B Project Paper II	X	X	X	X	X		
AKN 4799 Industrial Training	X	X	X	X	X	X	X

Example of course:
Course Name: AKN 3202 MANAGEMENT ACCOUNTING II
Level: Year 2
Credit hours: 3

Learning Outcomes:
At the end of this course, the student should be able to:
1. Prepare profit statements based on a variable costing and absorption costing system.
2. Distinguish between relevant costs and irrelevant costs for decision-making.
3. Construct an overhead analysis sheet and calculate cost centre allocation rates.
4. Describe how value chain analysis can be used to increase customer satisfaction.
5. Examine the differences between ABC and Traditional Costing Systems.
6. Evaluate the similarities and differences of TQM and Return on Quality.

Table 3: Relationship between GS and Learning Outcome

GS	Learning Outcome
Communication	LO4, LO5, LO6
Language Proficiency	LO6
ICT	LO1, LO3, LO6
Analytical	LO1, LO3, LO5, LO6
Learning to learn	LO2, LO4, LO5, LO6

Numeracy	LO1, LO3, LO5
Entrepreneurship	-

Note: LO refers to learning outcome
The learning outcomes stated above could be related to the integration of GS as shown in Table 3

- Curriculum evaluation

The final broad category of curriculum element is evaluation. It exists for two primary purposes. First, it attempts to measure whether the learners are achieving the content objectives set forth in the curriculum, and second, whether the curriculum is doing what it is supposed to do, which reflects its content validity. Therefore, the evaluation category of a curriculum should be divided into student evaluation and document validation elements.

INCORPORATING GENERIC SKILLS THROUGH THE CO-CURRICULUM COMPONENT

UMT also ensures that students' campus experience is enriched through different learning opportunities which include expanding their social network and skills through co-curriculum activities. This involves programs and activities that are created, developed and implemented to support soft skills either directly or indirectly. Through co-curriculum activities, the students are able to gain a physically and spiritually balanced and holistic education and the end result will be a more matured and confident student. In general, the importance of co-curriculum development at UMT is as follows:

- To incorporate and inculcate leadership qualities, staff discipline, organizational skills and teamwork.
- To provide space and opportunities for students to discover and develop their talents.
- To nurture the spirit of cooperation and unity.
- To provide opportunities for active participations in high performance and mass sports amongst students.

Co-curriculum courses are offered with the objective of producing holistic and versatile graduates. A maximum of one unit/credit hour is allocated for co-curriculum courses. A variety of co-curriculum activities are offered and these can be uniform activities, sports activities, cultural activities, leadership component and martial-arts activities.

Uniform activities

Uniform activities give more opportunities for students to develop their talents and skills through efficient networking with outside organizations. These activities also encourage students to lead a more active lifestyle through teamwork activities. In addition, uniform activities inculcate responsibility and leadership qualities in students with the intended outcome of producing citizens that are mature, patriotic and rationale.

Sports activities

Sports and physical fitness are considered as preparation for a healthy and active life. Students are encouraged to participate in a variety of sport activities such as football, hockey, netball and scuba diving.

Cultural activities

Cultural activities provide a holistic performing arts education towards producing a skilled and enlightened workforce who are aware of the unique and diverse population of Malaysia. It also promotes traditional Malaysian culture and at the same time support contemporary performances like regular theatre, music and dance performances.

Leadership component

Students can participate in these courses where they are trained on skills such as leadership, team work, problem solving and public speaking. This course can develop their talent and preparation for life after university and to give them a more competitive edge in their career development.

Martial arts activities

Martial arts are currently studied worldwide from a variety of cultures. Martial arts can improve student fitness levels and muscular condition immensely.

Flagship program - Sea Survival

Sea survival is a flagship program that has been designed as a component of the co-curriculum activities. It is compulsory for all the first year students at UMT. The main objective of this program is to expose essential survival skills to the students. Through this activity the students are trained to survive by learning skills to build shelters, gather food, make fires, and travel without the aid of standard navigational devices. These essential skills are required in order to live successfully through any survival situation. Additionally, through this program students learn to manage and survive life-threatening circumstances. A key ingredient in any survival situation is the mental attitude of the individual(s) involved.

Debates

Students are able to participate in debates through the university debate club. Students who show great potential may be invited to continue in the program depending on their performance with regard to several criteria. Parliamentary debates are done extemporaneously in which the topic changes from debate to debate. Debaters learn of the topic approximately fifteen minutes prior to the debate. The debates are spontaneous, engaging interchanges between well-informed and articulate students. In debates, the preparation and delivery of arguments provide students with the opportunity to think critically, develop their academic research skills, improve their communication abilities, solve problems creatively, and increase their self-confidence. This is due to the fact that students involved in debates regularly engage in writing, information analysis, in-depth library and internet research. Debates enable students to express their views effectively and to respond cogently to arguments with which they disagree. In addition, debaters are often the most well read and well-informed of students and by being debaters they take part in a truly worldwide examination of the issues facing humanity.

Industrial training

Industrial training refers to work experience that is relevant to professional development prior to graduation. Industrial training requires students to attend work in the industry for a minimum of 2 months (8 weeks) to a maximum of 4 months (16 weeks) depending on the corresponding program. This translates into a hands-on, no-lecture, focused industrial attachment. All students should make considerable effort and give sufficient thought into obtaining the most relevant and effective industrial training. It should also be noted that developing an awareness of general workplace behaviour and interpersonal skills are important objectives of the industrial training experience.

World Cultures course

This course exposes students to global knowledge, language skills and significant international experience. It is basically an electronic interactive learning that offers students a study on world cultures, societies and countries via virtual and collaborative dialogue and discussion with partners from other regions in face-to-face environment without having to leave their classroom. UMT is a charter member of the Global Partners in Education (GPE) program consisting of 21 universities in 18 countries. This main objective of this program is to engage partners through lecture exchanges, joint courses, and international research. The cultural exchange is based both on written communications between pairs of students (via ‘chatting’ and combined assignments) as well as through ‘web-streamed’ face-to-face dialogue.

UMT'S HOLISTIC FRAMEWORK FOR STUDENTS

Universiti Malaysia Terengganu is committed to producing graduates that will become creative professionals who are capable of developing innovative solutions to problems facing society. This will require graduates to possess analytical and critical capacities as well as the ability to synthesize ideas and adapt to new situations. In addition to integrating elements of generic skills in the teaching and learning activities in the curriculum, the UMT holistic framework for students are designed to develop skills (content skills, soft skills & ESQ (emotional spiritual quotient)), essential competencies, learning from industrial-training, and real knowledge through community linkages as well as a set of appropriate professional attitudes (Diagram 2).

The university strives to develop graduates equipped with a range of skills and attributes which will help them succeed in a wide and diverse range of tasks and responsibilities. Within this holistic framework, programs implemented for the students will facilitate the university in producing graduates that will be productive members and contribute to the society they live in. The development of these skills and attributes will take place in all courses in ways that reflect the particular discipline or professional field. While the skills and attributes have been listed separately it should be recognized that effective professional practice requires the ability to integrate knowledge and the different skills and attributes.

The assimilation of generic skills through both curriculum and co-curriculum embedded programs especially in the uniformed club and leadership activities provide value added competencies to the students. These findings have been supported by Bedrow and Evers (2005) and RSA (2006) whereby they have asserted the importance of embedding generic skills through the curriculum and extra curriculum activities. Egan (2004) in Luciana at el (2007) had identified key generic skill elements such as leadership, communication, team working and project management as important factors to building sustainable communities by incorporating them in the curriculum.

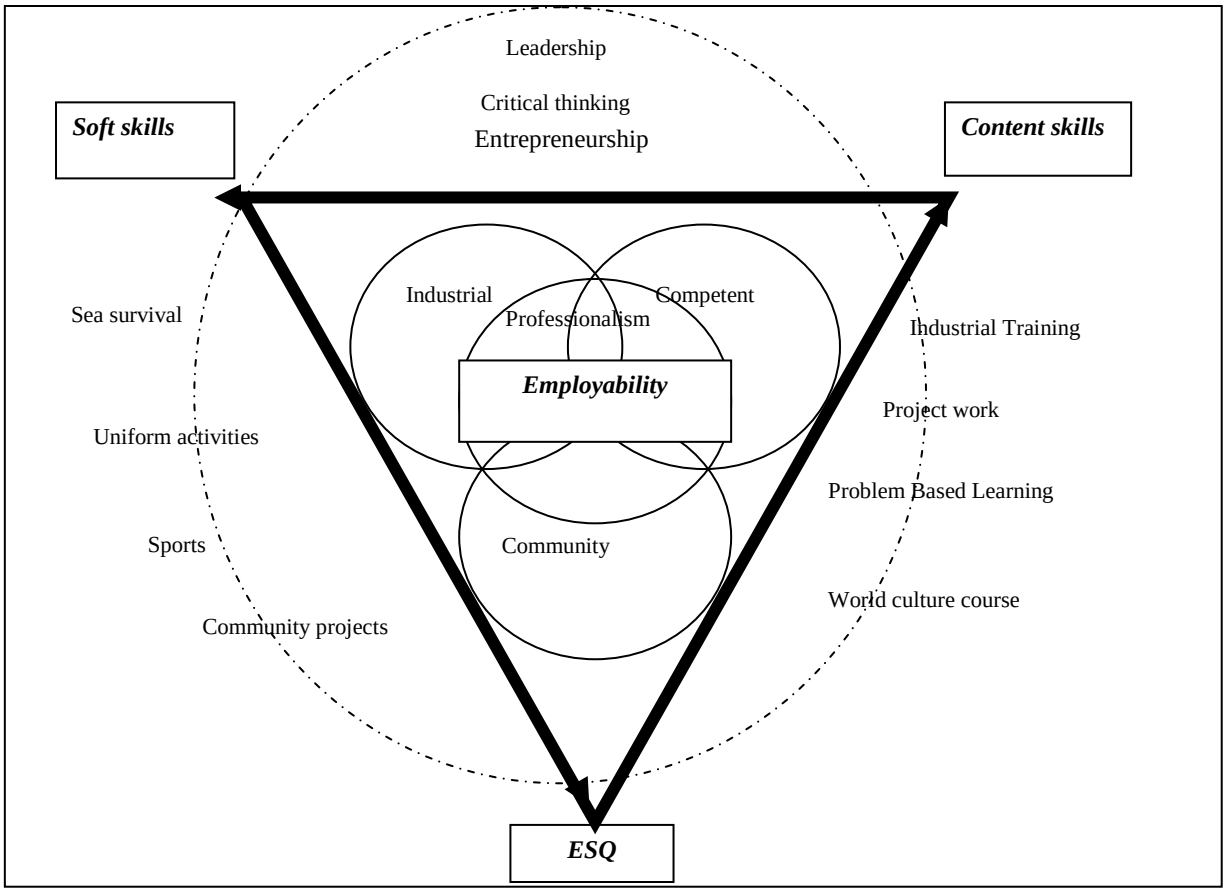


Diagram 2: UMT's Holistic Framework for Students

There has been general agreement by academicians and the industry practitioners on the importance of generic skills for the sustainable employment of the graduates. Due to the dynamic changes of the economy and industry, future curriculum content development has to be continuously benchmarked universally. At the same time, curriculum development needs to be locally relevant to the higher learning education policies in the country. Therefore a good balance between content knowledge and generic skills can be achieved through quality assurance and continuous improvement adaptation. Nevertheless the actual competency requirements need to be world class. This has been proven by professional programs worldwide such as in accounting, medicine, engineering, business and food and agriculture that have been implemented in the well-known universities namely Indian Institute of Information Technology, Chulalongkorn University, Monash University and Griffith University. In this regard, the holistic framework for student development in UMT is seen as a move forward to ensure that graduates have industry preferred work related skills and they will be able to compete and contribute in the globalized world.

DISCUSSION AND CONCLUSION

With the rapid development of new technologies and the impact of globalization, the graduates are more competitive and employable in the job market. This requires leaders in IHLs to take into consideration the role higher education can play for sectors of employment which were not taken into consideration in the past, in the process towards what is often called the "knowledge society", informal sectors of employment and new ways of self-employment. UMT has taken steps in this direction by developing a holistic approach for students' development. The approach emphasizes the development of skills (content skills, soft skills & ESQ (emotional-spiritual quotient)), essential competencies, learning from industrial training, and real knowledge through community linkages as well as a set of appropriate professional attitudes.

With respect to curriculum development, questions do arise as to what could be the optimal amount of learning effort should be allocated for generic skills development as the competing requirements for content and other competencies continues to rise. It further remains to be ascertained as to what are really the pertinent aspects of the generic skills that employers say that they cannot do without and as exemplified by UMT's framework, certain critical skills are thought to be more significant than others and the holistic make-up of the graduating student is believed to be more sustainable in the long run. Others have stressed that a final good measure of a University is the quality and value of the graduates which then calls for the continuous monitoring and evaluation of the quality and richness of the learning experience of the students whilst they pursue their studies. More recently, the pressure of university rankings has also impinged upon the apparent conflict of how best to spend university resources and direct the efforts of the university's expert manpower. In other words, the debate between how much to teach versus how much research has continued to be strategically debated and managed so as to strike a good balance for each university. Young universities should learn from the vast experience of others who have gone along this path and not fall into the trap of trying to over-achieve, at the expense of producing graduates that are employable and trainable.

However the success of this undertaking depends on the forward-thinking, commitment, monitoring, supervision and the availability of the supportive infrastructure. Higher education has to accommodate the fact that students have become more diverse not only in their motivations and capabilities, but also in their assignments and roles after graduation in order to respond to the broadening spectrum of graduate employment and work.

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A New Perspective for Quality Improvement in Teaching and Learning Processes

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ABSTRACT

Education has always been facing the challenge in ensuring that the quality of teaching and learning takes place effectively. One possible path for improving the quality of education lies in the application of a Quality Management approach as has been used in Industries, to the teaching and learning process. This paper adopts and uses the principles from one of the Quality Management methods, Total Quality Management as the pedagogical methodology and improved framework in managing, scrutinizing and enhancing the quality of teaching and learning practices in higher education. The paper focuses on the limited application areas of specific key components of a Total Quality Management tool on managing the needs, expectations and problems of the students, and on collecting feedback information for continuous improvement in teaching and learning process. Employing these Quality Management attributes into the education equation create values for educational institutions, employers, and students.

Keywords: Quality Improvement, Teaching and Learning

INTRODUCTION

The participative management philosophy of TQM that makes use of a set of techniques and procedures for transforming products and services has been extensively and successfully used by various organizations to improve the effectiveness, efficiency, cohesiveness, flexibility and competitiveness of a business as a whole (Glenn, 1991; Labovitz, 1991; Marchese, 1992; Zentmyer and Zimble, 1991). TQM philosophy that focuses on quality is founded and developed by several quality gurus such as W. Edwards Deming, Joseph Juran, Philip Crosby, Genichi Taguchi and Kaoru Ishikawa. For example, the key ingredients of quality are defined as fitness for use by the customer (Juran, 1989); quality aimed at the present and future needs of the customer, (Deming, 1986); conformance to requirements set by consumers (Crosby, 1979); the totality of features and characteristics of a product or service that bears on its ability to satisfy stated or implied need (BSI, 1994); the value a product imparts to customer from the time the product is shipped (Taguchi & Clausing, 1990); and quality product as most economical, most useful, and always satisfactory to the consumer (Ishikawa, 1992). Extending TQM principles, Seymour (1992) adopts and embraces the improvement strategy based on the plan-do-check-act (PDCA) cycle of Deming (1986), to coordinate on continuous improvement efforts especially for optimizing process model or production line. Hence, based on these literatures, TQM main principle and driving force is basically founded on the importance of customer satisfaction (i.e., customer-centered culture), leadership and continuous improvement effort by all involved within the system.

As with all industries, the need for quality improvement such as innovation and change is important for education. Today education is becoming more and more competitive just like commercial enterprises imposed by economic forces (Seymour, 1992). According to Freeman (1993), this competition between various academic institutions is the result of the development of global education markets and the decreasing pool of money for research and teaching, with only the more reputable

institutions getting a bigger pie from government and industry funding. Hansen (1993) asserted the rationale for adopting the participative TQM principles in universities, which is seen by many as having enormous potential to respond to the educational challenges. Cowles and Gilbreath (1993) contended that TQM principles could be applied as a means for improving student/staff morale, increasing productivity, and delivering higher quality services to customers. In an ASQC survey of American universities and community colleges, Horine et al. (1993) reported valuable benefits from the use of TQM, which includes: increased employee empowerment; customer satisfaction; teamwork; and culture change.

But in academia, who is the customer? Can we recognize students who are the direct recipients of the educational output as the customer or the government and private industries that hire the graduating students as customers? Should students be involved as customer in shaping the educational system? Some authors (Brower, 1991; Cloutier and Richards, 1994; Helms and Keys, 1994) argue that by satisfying students, institutions might risk compromising the needs of society as a whole; these authors preferred a process that modelled a fitness centre where students define their long-term goals and the institution prescribed the program for meeting those goals. However, others (Brigham, 1993; Rubach and Stratton, 1994) believed that both students and businesses needed to be treated as customers and they employed the concept of co-production that required the involvement and cooperation of educators, students, parents or businesses to achieve the quality outcome of the educational service. Universities focused students as internal customers and their needs appeared to attract the best recruits and in large quantities, thus enabling them to achieve superior competitive standards.

TQM MODEL FOR TEACHING AND LEARNING

Realizing the importance of the TQM concept in improving quality and productivity in industries, an attempt has been made in this study to discuss the key features of TQM principles in achieving the teaching and learning (T&L) goals for students. It is hoped that by applying particular aspects of the TQM techniques on education would result not only in resource savings but also greater learning satisfaction and achievement from students. The authors have developed a simplified TQM model for improving T&L processes, based on and similar to industrial TQM application. In this simplified TQM model, the pattern of information flow and its activities in the T&L process is shown in Figure 1. The aim is to fulfil or exceed the expectations of all affected parties involved in the T&L transformation process.

This theoretical model perceives students as both customer and employee, and satisfies them in all the T&L processes in accordance to the TQM view that a satisfied student/employee will learn more and better than a dissatisfied student/employee. In here, students acting as the immediate and internal customer as well as direct users of the education services are being transformed into valuable manpower for the future external customers (employers of university graduates). As internal customer with raw and unprocessed skills initially, students may not be able to specifically outline on how the T&L practices should be performed. Instead, they are treated as co-workers or internal employees guided by lecturers (as managers) in improving the T&L processes, and encouraged to provide their collective opinions and feedbacks, which are important to establish the requirements for any continuous improvement efforts. Their level of involvement and influence should increase with increasing level and maturity of their studies.

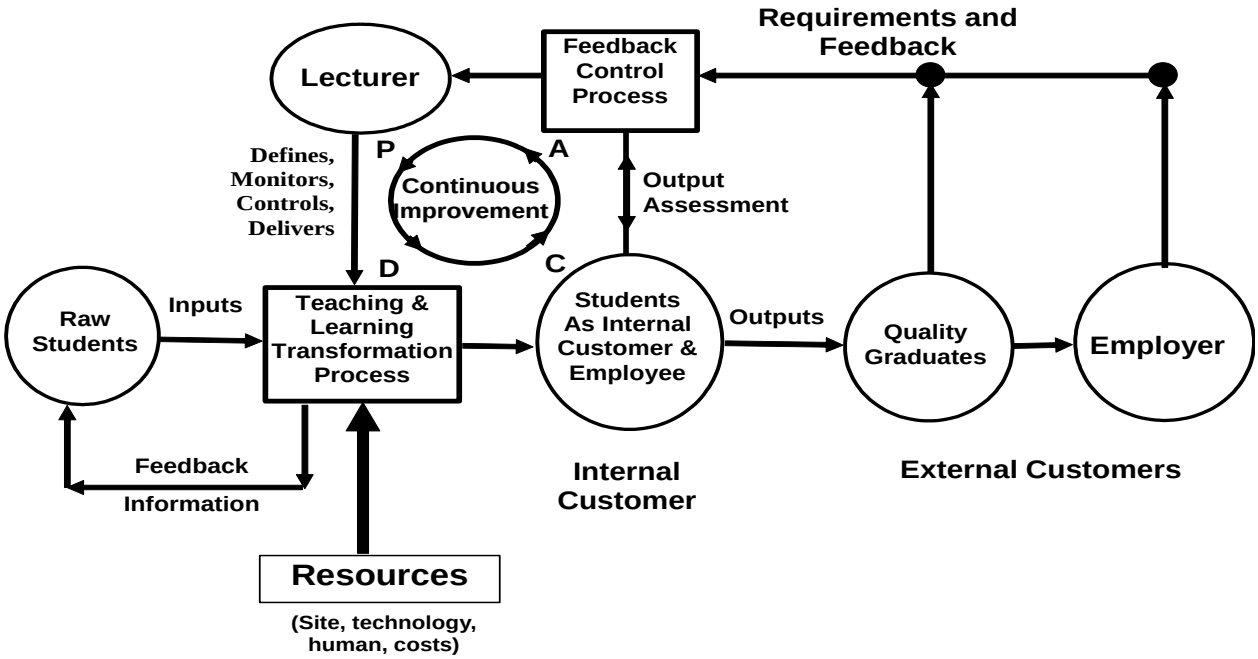

Figure 1: Simplified TQM model applied to the T&L processes in the classroom environment

In the model, the output assessment for the effectiveness of the T&L process flows into the feedback control process, which monitors and determines the corrective actions required for the next improvement stage. The model also contained an infinite inner-loop process (i.e., Deming's plan-do-check-act (PDCA) cycle), which drives the continuous assessment and improvement of the T&L process. This continuous improvement process with on-going feedback provides the framework for evaluating objectives, assess outcomes, and improve the T&L programs and strategies that are critical to attaining and exceeding T&L goals. The lecturer job is to manage, monitor, control and deliver the T&L improvement process, and work continuously to improve the T&L processes in incremental steps (e.g., content, delivery, competency, management, assessment, attitude, services, etc) by soliciting feedback from the students and drive the students to learn. In this approach, the T&L process transforms first year students (internal customers) into knowledgeable and skilled students to employers (external customers) over a period of 3 to 4 years in which the students slowly increase his/her self worth or value through their education experience. We propose that the output product is not the student but the education of the student, and this definition requires the students to take an active role in the development of the product (education) and eventually transform this output product (e.g. academic achievement, skill, experience, knowledge, and competency) into a lifelong learning education process. Only through such a strategy will eventually better prepare them for the complex challenges of the engineering field as well as enables them to react quickly to any changes in new emerging knowledge and tools. For ensuing success, this transformation process requires the support and the simultaneous working together of several resources from academic and supportive staff, departments and faculties, student affairs, resource centres, and financial services.

In reality, the input designated in a TQM system can be students, faculty and staff, funding, facilities, and university goals but for this model we simplify the input to signify students. The selection of inputs on students entering into the universities and the type of processes/tools used can influence the output quality. Therefore, performing the basic quality control techniques by marketing function on the recruitment of entry-level students may result in the type of expected quality output level.

Correspondingly, the model also shows that feedback from students and employers can help in the continuous improvement effort in refining, designing and redesigning the T&L process. However, this improvement can only happen when both lecturer and student work together to identify, analyse and make improvements to the T&L process.

This model also aims to improve student learning that results in lowering student failure rates and in graduating students on time by maximizing opportunities for learning in every lessons. This type of improvement reduces wastage of university resources such as time, effort and money by producing students with the correct specifications in terms of the essential & desired skills and knowledge that delight the employers. In TQM terms, wastage is the cost of non-conformance or doing things wrong, and this may include student dropouts, student failures in mastering any subject or class, retention of students in a grade or year, etc. If university has the right quality of lecturers, students' inputs and technological resources in the system, then the quality of the output produced should naturally be dependent on the effectiveness of the T&L practices. In order to know that we are doing things right or reaching the required level of quality, we can assess this by applying Deming (1986) TQM philosophy to keep cost down and increase student satisfaction. Such measures can be drawn from the feedbacks given by students, employers and colleagues, in which continuous corrective actions can be quickly taken to improve its content, mode and method of delivery, programs, teaching, and assessment methods.

Because the scope of education process is so broad, we will attempt to discuss the application elements of TQM method, which focuses only on the limited areas of T&L strategies in classroom with a commitment to continuous improvement by collecting quality feedbacks from students. The students are considered as both the employee, and internal and immediate customer of the university. The objective is to use TQM principles to drive T&L towards excellence by working towards a continuous improvement effort or performance breakthrough of such practices. Adopting this model requires lecturers to be more open to change in the method of teaching and delivering course materials to students through the use of innovative teaching strategies and technologies.

TQM APPLICATION IN CLASSROOM ENVIRONMENT

The T&L model focuses on building quality relationships among lecturers (as managers), students (as doers of work), and content (as learning materials). Knowing how this relationship work will allow one to organize and choose appropriate T&L tools and methods to make effective learning happens. Lecturers as managers must effectively manage and organize the efforts of students so that they in turn can approach their learning with enthusiasm and participative mood. Therefore we need to insist on quality in everything, by focusing on improving the quality of every action and interaction in the T&L processes such as total quality improvement in teaching, subject design and objectives, course notes & books, resources, staff-student interactions, assessment, subject evaluation, etc.

Recognizing that not all students are willing to go extra mile in their learning, this model suggests that one should guide and motivate those who are less likely to work extra hard and persevere towards a goal, for example by adopting Maslow pyramid model to develop learning motivation for students (Maslow, 1970). This model requires one's passion or burning desire that teaches student with conviction. In this context, it is a lecturer's responsibility to motivate and cause student to learn but students is required to take responsibility in their learning. We need to get the feedback and listen to students to see what we may need to change to become more effective – e.g. changed lesson plan, style, appropriate humour, gently confronted problem student. The fact that we have almost full control over every major element in the T&L process such as control over subject (spoken words, depth of topic, make changes, jokes, illustrations), and style (mode of delivery, tone of voice, facial expressions, movement, actions, using groups, discussion or debate), makes us even more responsible for our students. So knowing these factors, the challenge is to immediately recognize any learning problems and then implement the corresponding solution with the correct and appropriate use of the subject, style and technology.

Figure 2 is a simplified interaction model developed by the authors, to show how lecturer and student interactions should take place in the T&L process. A feedback loop is included in which the lecturer listens to the students so as to make continuous improvement to the delivery of information that is able

to cause student to learn continuously in the acquisition of knowledge, experience, know-how, wisdom and character. The moulding of characters should form part of the teaching strategies that give value to employers. This interaction model requires the lecturer total commitment in teaching who takes full responsibility by actively causing the student to learn. In here, the lecturer communicates the information of the subject matter to the students by simultaneously focusing and interacting with the students to motivate and get their attention.

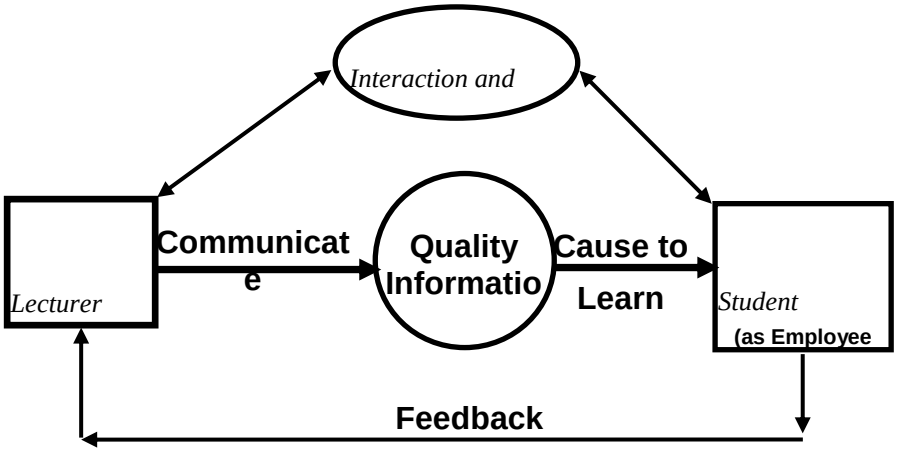

Figure 2: Teacher-student interaction model

The interaction model ensures that every student involved in the learning process is assiduously meeting out their learning requirements, and in providing them with satisfaction in their educational experience. This total commitment involves investing our time and energy that we are professionally responsible and accountable to develop the students in the total quality environment. Some examples of the learning requirements can be more personal attention; using more multimedia and visual application rather than all lecture; more lecturer-student interaction; having more interesting, meaningful and practical or real life lecture contents that are presented with the latest technology; mark and return all student submitted coursework quickly; teach materials on the student's level; give more demonstrations or hands-on approach to certain topics; timeliness and accuracy in the provision of information and services; and more group activities.

For any continuous improvement efforts to occur, we must determine what corrective actions need to be taken to produce the desired changes in efficiency, quality and satisfaction. For an application example, continuous improvement can be achieved by receiving feedback from students at the end of each lesson. Students are prompted to see what important things that have been learned in class, and what outstanding issues that have not been resolved or answered. Any lecture contents that have not been explained clearly or understood as intended can be either clarified during the last few minutes or at the beginning of the next class session. This type of feedback keeps one knowing what action and improvement need to be made or what points need to be reviewed, reiterated and recapitulated so as to make the learning experience in classroom better.

Our interaction model requires students to participate throughout their learning effort. This practice is important because quality of teaching and learning is linked together. For example, to make students learn, retain and use the information and material better, the subject topics should be taught by combining presentation with activities and interaction. This requires us to design relevant materials/activities for maximum student participation that leads to dynamic and interactive exchanges in the classroom environment. This building of relationship with students involves care, respect, trust and openness. We find that one of the best ways to build relationships is to ask many questions as well as encouraging students to ask questions. Asking relevant questions and carefully listening to student's answers allow one to determine the level of knowledge and maturity of the student, and what areas need further emphasis. For example, we can arrange them in teams to let them think, discuss and solve

the problems with or without hints provided. We know that learning is taking place when students think and ask questions that give insight into it. This method leads to the development of new ideas and solutions to complex problems.

EVALUATION AND ASSESSMENT PROCESS

Our models adopt the evaluation and assessment as continuous improvement process that contributes to the enhancement of quality. Producing quality graduates requires identifying activities that need to be controlled, monitored and overseen throughout the complete cycle of the T&L process. One of the important features in our model is the measurement of performance to ensure conformance to customers' expectations. One cannot make any effective and efficient changes or know what exactly need to be changed without clear analysis and understanding of the feedback results. For example, to be "fit for use", the collected feedback must produce quality information that can guide the designing and redesigning T&L process.

Getting reliable feedback information of one's action is essential to continuing the incremental improvements process especially made for every semester otherwise we will not know how well the students are learning or how students respond to specific T&L approaches. Course grades, marks, syllabus, examination/test papers, in-class activities, student performance on tutorial problems, suggestion boxes, student critiques, peers & students feedback, surveys and evaluations form parts of the TQM teaching processes to establish the quality standards. For example, lecturers can examine set of graded papers for common error patterns, talk and listen to students about the graded papers, and check on their verbal understanding and skills of specific concepts that reflected in their submitted work. With this feedback information, students can have a clear indication of how well they are meeting the subject outcomes at that time, understand the quality of their work, what they need to change, modify, adapt and improve their work and/or performance. The process of course improvement and delivery (Zaciewski, 1994; Smith et al., 1993) can be based on Deming's plan-do-check-act (PDCA) cycle that includes: identify gaps and variations from students' feedback; analyse instructional process; plan actions to improve quality; implement actions; and evaluate customer satisfaction surveys. For example, unlike in traditional classrooms where lecturers often follow this sequence: Plan → Teach → Test, but in the continuing, never-ending nature of process improvement model, we can use a Plan → Teach (Do) → Check and determine which learning outcome students have missed (Check) → Revised T&L (Act) → Test, with each cycle producing improvement.

Class interview techniques are another source of feedback for T&L improvement. This may include standardized questionnaires that probe students about what they like best and like the least, suggestions they have for the teaching process, specific areas of concern. Additionally, lecturers can encourage students to form a class committee at the start of the semester that is composed of students charged with collecting and providing feedback on the course and teaching performance from the student point of view. Lecturers can also ask students to comment on a blank sheet of paper towards the end of the lesson about T&L problems they faced in class, suggesting whatever changes to improve their learning.

Feedback information obtained from peers can be used to refine and improve the course goals, the way course and activities and tests/examinations are structured, and the accuracy and quality of printed and distributed materials with clarity of explanations in all content specifications. In the observation of teaching, peers can use a pre-established rating questionnaire for recording information. Better and more accurate feedback information can be received using multiple observations per peer, and using many skilled observers.

Here at Monash University, there are various methods of evaluation available to assess the teaching and materials quality of lecturers that are conducted by MonQueST. For example, these survey questionnaires for teaching solicit information concerning: the organization and structuring of the lectures; effects on one learning and understanding; levels of interest and motivation; lecturer's

interaction and support; and physical aspects of presentation. Whereas the feedback questions for subject course materials solicit information concerning: subject organization; reference materials; workloads; assessment specifications; and assignment or submitted work.

CONCLUSION

Good teaching matters as quality teaching produces quality learning that creates quality students and makes customers satisfied. As such, TQM is one useful tool in the T&L practices at university even though it was developed initially for the manufacturing industries. Our models adopt a view that quality teaching that actively involves interactions and participations with the students can make a significant difference to cause student to learn. The challenge is to ensure every student can be benefited from the T&L process by giving them enough time, support, motivation, resources and opportunity to learn to reach the agreed standard of excellence in education in a total quality environment. To implement these TQM strategies, it requires us to have the correct attitude and approach with the ultimate aim to continuing striving to improve all areas of entrusted responsibilities.

The models adopt specific TQM tools and principles to enhance T&L quality that allows one to follow clear aims and objectives; makes continuous improvement in teaching, learning and assessment methods; and is willing to be judged by others. For any continuous improvement effort to be effective, quality and reliable feedback information is essential and important in the evaluation procedure of T&L with the output clearly defined and measured. It involves processes that continuously collect, analyse, and act on customer information.

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Students Ranking, Based on their Abilities on Objective Type Test: Comparison of CTT and IRT

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ABSTRACT

The focus of this paper is to investigate the idea of differential ability for students ranking on a multiple choice test in the subject of physics at secondary level. The weakness of Classical Test Theory (CTT) in measuring the ability with continuity and consequently its ranking ability of students on the basis of ability has been highlighted in this paper. In CTT, a student attempting a difficult question and an easy question get equal credit which is not the case in Item Response Theory (IRT). Moreover in CTT two students with equal raw score have the same ranking while in IRT they have different ranking, making the job of policy maker easier to take decision. Two contemporary approaches, CTT and IRT were compared on their suitability for ranking and measuring true ability on teacher made test. The sample was 400, 9th grade students taken randomly from a variety of population in Pakistan. A content valid test of 80 multiple choice items was used as instrument .This attempt is an illustrative example that this problem can be overcome by using of Item Response theory in measurement. The implication of this work for the teachers is to give more stress on teaching cognitive skills rather than knowledge and for the policy maker to evaluate the students on the basis of their cognitive skills achievement to award scholarship and recruitment.

Keywords: Ranking of Students, Item Response Theory, Students Ability, Classical Test Theory

INTRODUCTION

Assessment is an indispensable part of educational process. A major purpose of assessment in educational settings is to measure students' achievement in order to make a variety of decisions based on students' performance like to know their present level of learning and to what extent are they ready for next learning experiences? "Advances in technology and the growing presence of computers in assessment provide tremendous opportunity to explore new ways to improve the quality of assessment data" (Klein & Hamilton, 1999). The innovation in testing techniques like computer based administration of tests enables us to collect additional information related to the interaction between each individual examinee and a single item on the test. In theory of measurement in education and psychology there are two contemporary approaches namely Classical Test Theory (CTT) and Item Response Theory (IRT). Both are used to measure a sample of behaviour and a numerical value is assign to the behaviour for quantification. In CTT the number of correct score is often taken as ability. Moreover CTT measurement is holistic in nature and is based on the test as a whole while in IRT item

is the unit of assessment. Many studies have been conducted to investigate the comparability of items and person statistic. Theoretically CTT is simple and easy to apply that is why its test statistics are still commonly used in test construction process, however many researchers have questioned their utility in the modern era. Hambelton and Jones (1993) also expressed their reservation about the use of classical test theory estimators by saying that "classical item statistics such as item difficulty and item discrimination (i.e., point biserial correlations) and test statistics such as test reliability are dependent on the examinee sample in which they are obtained". Similarly Fan (1998), Cantrell (1997) and Henson (1999) has summarized and noted this problem as the estimators coming from CTT are circular dependant i.e. the items parameter depends upon the examinee and the abilities of examinees are function of items parameter.) This circular dependency in the case of easy test can exaggerate the ability estimates of the students and difficult test can do the reverse job by underestimating the abilities of examinees. Therefore, it is difficult to generalize the classical test theory estimators across populations especially when they are at variance in abilities. Courville (in Traub and Rowley, 1991) wrote that classical test reliability shows the quality of a set of test scores and hence, reliability is dependent on characteristics of the group of students who take the test, in addition to being dependent on characteristics administration of the test. Comparison of performance of different examinees is another noteworthy limitation of CTT because the examinees must be given either the same or parallel items. The problem is further accented by a third limitation of classical test theory in that parallel forms are difficult to achieve. A fourth problem of classical test theory as reported by Courville (in Hambelton & Swaminathan ,1985) is that it provides no basis for determining how an examinee might perform when confronted with a test item. Finally, the theoretical assumption that the measurement error is the same for all examinees is another limitation of CTT which may lead to inappropriate ability measures.

Due to these criticisms there is a trend for shifting the focus to the Item Response Theory among test developers and other stake holders. Furthermore the appropriateness of both frameworks for ranking of students on the basis of their ability is an open question which we have addressed in this study.

ITEM RESPONSE THEORY: Item response theory (IRT) is, for some researchers, the answer to the limitations of classical test theory as stated by Courville (2004, p.44). Item response theory (IRT) looks at the examinee's performance by using item as the unit of assessment. Cantrell (1999), Hambleton & Swaminathan, (1985) and Henard (2000) consider IRT as a modelling technique that tries to describe the relationship between an examinee's test performance and the latent trait underlying the performance.

There are two general factors in measurement while using CTT approach, an observed response (X) i.e. scored obtained by the students on a particular task and a true ability (T) which is the real potential in a student. This relationship in theoretical model of CTT can be written as X=T+E where E is random error of measurement . IRT in comparison to CTT is based upon a family of the mathematical models. Thus, both models are liable to mislead because they are dependent on the assumptions a researcher is putting forward while working with given data (Hambleton & Swaminathan, 1985).

Hambleton and Swaminathan (1985) have pointed out the following four characteristics of an item response model. (1) An IRT model must give specification the relationship between the measured score and the underlying unobservable construct. (2) the model must provide a way to estimate scores on the ability. (3) The examinee's scores will be the basis for the estimation of the underlying unobservable construct. (4) this model assumes that the performance of an examinee is completely predictable or can be explained from one or more abilities.
Three models popularly used in IRT are 1-parameter, which is

$$P(\theta)= \quad e^{a(\theta)}/1\text{-}e^{a(\theta)}$$

Where $P(\theta)$ is ability of a student and $a(\theta)$ is difficulty level of item and e=2.73 discrimination index $b(\theta)$ is taken as 1 in this model. In 1-parameter model discrimination is taken as 1 and this may not be

of great utility where sharp measurement is required e.g. students with equal raw score will have equal IRT score and thus may fail to produce ranking.2-parameter Model which is

$$P_i(\theta) = \frac{e^{a_i(\theta - b_i)}}{1 + e^{a_i(\theta - b_i)}}$$

In 2-parameter model both discrimination and difficulty of items are taken into account which enables us to differentiate between the abilities of person with equal raw score, similarly 3-parameter model involves another variable i.e. chance factor c_i for item "i" in attempting an item.

$$P(\theta) = c_i + e^{a(\theta - b)} / 1 - e^{a(\theta - b)}$$

When the two- and three-parameter item characteristic curve models are used, an examinee's ability estimate depends upon the particular pattern of item responses rather than the raw score. Under these models, examinees with the same item response pattern will obtain the same ability estimate. Thus, examinees with the same raw score could obtain different ability estimates if they answered different items correctly. (Baker, 2000, p.136)

This is one of the reasons that we opt to use the 2-parameter model instead of 1-parameter model.
Estimation of ability focuses on an individual student's responses that give maximum information. Only those items are used to estimate students' ability which have difficulty level of 50% which means at this level the students are 50% likely to get the item right and 50% likely to get the item wrong. A good and informative item is one that has moderate difficulty. The test item which is either too difficult or too easy tells us nothing about the students ranking. This is because too much easy item will have the chance to be attempted by almost all of the students without any brainwork and therefore is not feasible to discriminate them on the basis of ability. Similarly, too much difficult will be attempted by none, accept guessing, and therefore not feasible for ranking purpose. Cox & Gorsuch (2000) study this property of an item.

Ability is a continuous variable and IRT gives continuous estimates. CTT gives discrete estimates especially in dichotomously made test and may create discrepancies in students' ranking by total raw scores and IRT student ability estimates. This property has been exploited in this work to make the job easier for policy maker in awarding scholarships or admission. The superiority of IRT upon the CTT for the purpose of ranking comes from the fact that on CTT scale many students may have equal raw score and therefore the task of ranking becomes more difficult for policy maker. In IRT, the score is weighted on basis of parameters of item attempted by examinee and therefore it less likely for two examinees two have equal raw score. This case may happen when two or more examinees attempt exactly same items or items with exactly same parameters, but the probability of such a situation is very low. The examinee attempting more difficult items will get higher rank automatically.

Cox and Gorsuch (2000) discussed the point that Students' ability estimates give better measures when using only the items at a level of difficulty at which students are likely to get the item right with probability of 50% , and get the item wrong with the same probability. This feature may create discrepancies in students' ranking in that some students who get higher total raw scores may get lower IRT student ability estimates, and conversely, students who are in higher IRT student ability rank may get lower total raw scores, this discrepancy occurs automatically due to built in mechanism of credit and penalty in IRT approach ; then which set of scores should be accepted. They argued that depending on the total sample size, the IRT student ability estimates is probably the right choice. Even if the sample size is smaller (below 100), which may lead to more error in estimation, ability estimates generated by IRT are likely to be more precise than its counterpart CTT approach. The ability range in IRT estimates is between $-\infty$ to $+\infty$ theoretically but typically they range from +3.0 for student with high abilities on the test to -3.0 for students with low abilities. The two extremes of infinities are for

over fit cases where the students either gives correct answers for all items or gives no correct answer, such cases are omitted from IRT analysis. The difficulty estimates in IRT for items range from +3 to -3. The item with difficulty level +3 and -3 are labelled as “very difficult," and "very easy" respectively.

PURPOSE OF THE STUDY

The main objective of this work is to compare CTT and IRT for their suitability of students ranking on the basis of their scores for awarding scholarships or admission.

METHODS AND MATERIAL

Data Source

Four hundred students selected randomly from both private and public schools in District Malakand of Pakistan, including both genders provided data for this study. A test with 80 multiple choice items was administered.

Sample

Due to tedious nature of IRT analysis without a specialized software and manual marking 100 students were selected randomly for final analysis.

Tools

Matlab software was used for programming to calculate IRT estimates. For this purpose the researcher developed the programming themselves and no specialized software for IRT was used. The program coding can be seen in appendix B.

Description of the Test

The test was developed by the researcher according to table of specification and was validated with the help of subject teacher. Item analysis revealed that the test is consisted of a variety of items from very difficult item with difficulty level of 20 to very easy item with difficulty level of 83.

Item difficulty of each of items in the test was computed by means of the following formula, in which R is the number of students who answered the item correctly and T is the total number of students in the test:

$$\text{Item difficulty} = \frac{R}{T} \times 100$$

To calculate the difficulty level of each item, 27% high achiever and 27% low achiever were taken. It was assumed that the responses of the students in the middle group follow essentially the same pattern. Item discriminating power of a test item refers to the degree to which it discriminates between students with high and low scores. Discrimination power was computed as the difference between the averages percent score of high and low achiever.

RESULT AND DISCUSSION

The test was scored using both approaches and ranking was made on the basis of both CTT and IRT scores. It was observed from the ranking that there is considerable shift of students ranking when it was made on basis of IRT. For example in CTT the top students was with score 72 and second was who scored 68 but in IRT ranking this ranking changed and 68 was on top of the ranking. When the

answer sheet was analysed it was evident that IRT ranking is better because student with score 68 selected wrong choices for easy items and thus got less penalty while students with 72 in CTT relatively could not answer the difficult items and got more penalty consequently lost his ranking. Similarly two students who got 64 score in CTT were placed 4th in CTT ranking while in IRT ranking they were placed 4th and 6th respectively. Four students obtained 60 scores and were all in the same ranking in CTT clearly showing the inability CTT approach to decide which one was better while they were given different ranking in IRT where item was playing the role to decide. Students No.9 who was placed 19th in CTT ranking was given better position in ranking due to the fact that he gave correct choices for most difficult items. During the analysis it was found that only 9 students out of 100 had the same ranking on both scales, 52 students got better ranking while 39 lost their position. This analysis clearly unveils the utility of IRT approach. Analysis of top 15 students has been given in the table below.

S.N0.	IRT	Raw score	IRT Rank	CTT Rank	**Difference**
1	4.661	**68**	1	2	-1
2	4.099	**72**	2	1	1
3	3.823	**66**	3	3	0
4	3.063	**64**	4	4	0
5	2.345	**63**	5	6	-1
6	2.283	**64**	6	4	2
7	2.066	**63**	7	6	1
8	2.051	**60**	8	10	-2
9	1.989	**54**	9	19	**-10**
10	1.816	**60**	11	10	1
11	1.799	**58**	12	15	-3
12	1.749	**60**	13	10	3
13	1.861	**61**	10	8	2
14	1.712	**60**	14	10	4
15	1.674	**57**	15	16	-1

The abilities measures form IRT for 25 students out of 100 were between +1 to +3 showing that the ability level was very high for those students as compared to the test difficulty level. While for remaining students the ability level and test difficulty level was comparable.

The correlation between CTT and IRT was found to be 0.95 which indicates a high correlation.

CONCLUSION

For small sample of 100 taken in this study, CTT-based and IRT-based examinee ability estimates were very comparable and highly correlated (0.95), indicating that an analysis of the ability level of individual examinees will lead to similar results across the different measurement theories. This is in accordance with the findings of Courville (2004), Lawson (1991), Fan (1998), Stage (1998), and MacDonald and Paunonen (2002).

The results in this study, based on the differential measurement of IRT, clearly uncover the weakness of the classical test theory in terms of ranking in the cases where it is seriously required. For example in the competition for admission of professional colleges or awarding scholarships like HEC in Pakistan some time a number of candidate obtain equal score and the decision is then left to other measures like score in previous exam or non academic measures like age.

This study has the implications for teacher as well in the sense that teacher should stress in the learning of skill and higher order thinking instead of knowledge based domain which has less value than the former.

The result of this study support the claim of (A. Hotui, 2006) that objective type test can be used to measure high order skills because it was observed that the item which were falling in domain of higher cognitive skill were difficult and thus those students who failed to give correct response got more penalty in terms of losing score . The scores were from both CTT and IRT with a correlation coefficient of 0.95 which supports Courville (2004, p.113) and courville (in Nunnally's, 1979) assertion that when scores obtained by two approaches are correlated they correlate by degree of 0.90 or higher; thus it is really hair splitting to argue about any difference between the two approaches.

RECOMMENDATION

The result of this study is a guide line for policy makers specially those who are engaged in awarding scholarships or giving admission in professional institutions on the basis of test scores to adapt the IRT approach while measuring the abilities which clearly has the advantage of differentiating among students having equal raw score.

This work was carried with a 2-parmeter model which takes into account the difficulty and discrimination of items, to exhibit the ability of IRT approach in measuring the ability along continuous line enabling us to distinguish between students with different abilities clearly. The area of possible research is to replicate this study with 3-parameter model where chance factor also comes into play and to see what difference it makes in the ranking of the students.

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Appendix A

The Matlab code for computation of parameters of an item and person.

```
% In the name of Allah, the beneficient, the merciful
%----------------Atiq-ur-Rehman Kashmiri-------------
% This file is to compute item parameters, given abilities
% and response
clear
load abilities
load response
clear abil resp
for i=1:size(response,2)
   abil=abilities;
   resp=response(:,i);
   save abil abil
   save resp resp
   a=[.1 .1];
   options=optimset('LargeScale','off');
   out(i,:)=fminunc(@likelihood,a,options);
end
function l=likelihood(param)
% This computes likelihood of an item given its parameters
% i.e. difficulty and discremination
%
% Since the function we maximize take only one argument
% i.e. the variable which we try to maximize
% the other arguments will be called through global command
%
%  before we use this file following variable should be specified as global
%  1. abil, the initial guess of abilities of the students
%  2. resp, the response of respondant on the item

load abil
load resp
diff=param(1);
disc=param(2);
for i=1:size(abil)
   arg=exp(disc*abil(i,1)-disc*diff);
   p=arg/(1+arg);
   if resp(i,1)==0
      lik(i,1)=1000*(1-p);
   end
   if resp(i,1)==1
      lik(i,1)=1000*p;
   end
end
l=-log(prod(lik));

% In the name of Allah, the beneficient, the merciful

%This file will compute the revised abilities of students
```

```
% by maximizing likelihood
% given parameters of items and the response
clear
load response
load parameters
clear param resp
for i=1:size(response,1)
   resp=response(i,:)';
   save resp resp
   a=0;
   options=optimset('LargeScale','off');
   result(i,1)=fminunc(@likelihood2,a,options);
end
function l=likelihood2(a)

% In the name of Allah, the beneficient, the merciful

% This computes likelihood of an item
% for fixed parameters and
% at given ability level
% the response and the parameters should be
% given as global variables a priori
%
%=====================================================
%
load parameters
load resp

for i=1:size(resp,1)
   param=parameters(i,:);
   diff=param(1);
   disc=param(2);
   arg=exp(disc*a-diff);
   p=arg/(1+arg);
   if resp(i,1)==0
      lo(i,1)=100*(1-p);
   end
   if resp(i,1)==1
      lo(i,1)=100*p;
   end
end
l=-log(prod(lo));
```

SECTION THREE - WORK IN PROGRESS

The following papers have been refereed and are accepted as a Work in Progress Only

A Study of Status, Problems and Needs of Thai Student for the Online Training Program with the Synectic Learning Technique

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ABSTRACT

The purpose of this research was to examine the status, problems, and needs of Thai students for their online training program with the use of Synectic learning technique. The results of this study will be used as a guideline to develop the online training program to increase the Synectic competence of students. The population of this study was in high school students in Sisaket province where in the training program was insufficient in terms of contents, skills, and standards. The samples consist of 122 high school students who studied weaving design courses at their school, and they were selected by stratified random sampling technique. Questionnaires were used for collecting the data. The instruments consist of five sections: demographic data, status, problems, needs, and suggestion for the online training program with the Synectic learning technique. These questionnaires were tested for validity and reliability. The Cronbach's alpha reliability coefficient of the third and the fourth sections were 0.93, and 0.94 respectively. Statistical devices used in this study were percentage, means, and standard deviation. The qualitative data will be grouped by using content analysis. The results of this study were as follows. (1)Status of using Online Training Program with the Synectic Learning Technique found out that 91% of students had never used online training because they never knew the online training and computer was insufficient. Nine percent of students used online training for their assignment. The period of time for training was 1-2 hours. Most of them used their own computer at home. (2)The problems of online training were found out that the speed of internet was low. The students had no skill for using the internet. Personal computer training and financial support was insufficient and content of online training was not varied. (3)The need of online training was found out that they wanted to increase the speed of internet access, to improve their skills of using internet, to provide high speed internet and accessories and user friendly interface. For suggestions, the training online should be easy to use and to be understood. The content should be varied and can be selected. The animation should be used in online training.

Keywords: status, problem, needs, online training program, synectic learning technique

INTRODUCTION

Today's technology is extremely advanced. This technology's matter enables people to live their lives with convenience and ease. The cultures and norms are needed to develop and converse themselves to the new world. It is very important that people should have education and took advantage of these technologies because it is the most important thing that matters of today's people for their survival in the society, community and throughout the world.

Synectic gives the people an idea of its new ways of learning online so that this program will stimulate and established the new ideas for people who used the program and created the new ways of thinking in a positive way. It is very important to develop peoples' ability of the new way of thinking. These advance programs gives people to create their own new ways of advertising and broadcasting that they haven't even imagine to do it in previous educational contents. Joyce & Weil, 2004 mentioned the benefit of the activities of the Synetic program that it helps converse of the idea of students and educators of joining the new ways into the new creations.

Online training takes less effort of installing big and complicated utilities machineries. Synectic is an advance program and up to date in this era, the positive aspects of the program might give an advantage and educate people for better ways of learning. Researchers foresee the significant of Synectic program that people would acknowledge from the program. So, the idea of waving sign needs to develop. Therefore, a group of students can be made up as time is running and they would live their lives up to an advance technology with supporting online learning program by using the Synectic.

OBJECTIVE OF THE STUDY

To study the status, problems and the needs of the Thai students for their online training programme with the Synectic learning technique.

OUTCOMES OF THE STUDY

1. The information and data will be used as a guideline to develop the online training program to increase the Synectic competence and relate to the needs of the students.

2. To reduce the problem of the programmer, that they may not have seemed purpose of the same training ability.

RESEARCH METHODOLOGY

a. Sample

The populations of this study were 122 high school students in Sisaket province who studied weaving design courses at their school, and they were selected by stratified random sampling technique.

b. Instrument for Data Collection

Survey forms concerning the status, problem and need for Online-training programme with the Synectic Learning Technique.

c. Data Collection

The research was conducted in the following steps:

1) Review the literature regarding the Online-training program.
2) Developed a questionnaire status, problem and need for online-training program.
3) Collect data using the questionnaire developed.
4) Analyse the data and conclude the results.

d. Data Analysis

Data were analysed by using descriptive statistics

RESULTS OF THE STUDY

1. Status of using Online Training Program with the Synectic Learning Technique found out that 91% of students have never used online training because they never knew the online training and computer was insufficient. Nine percent of students used online training for their assignments. The period of time for training was 1-2 hours. Most of them used their own computer at home.

2. The problems of online training were found out that the speed of internet was low. The students had no skill for using the internet. Personal computer training and financial support was insufficient and content of online training was not varied.

3. The need of online training was found out that they wanted to increase the speed of internet access, to improve their skills of using internet, to provide high speed internet and accessories and user friendly interface. For suggestions, the training online should be easy to use and to be understood. The content should be varied and can be selected. The animation should be used in online training.

DISCUSSION

1. The statuses of online learning were discovered at 91%. These 91% of the trainees had never experienced online learning before. As a result, they don't know the process of the online learning. One of the problems of learning online is that computers are not enough for students. 9% of the students who were learning online before they studied by combining with their regular register courses. They were using their own computers at their homes by spending their spare time 1-2 hours at the most.

2. The problem that they are facing on learning online is that they don't have the high speed internet access. The computer runs very slowly and they are still using the dial up internet connection. The numbers of the computers however aren't enough for students to use because the financial supposed for the online training and the contents are limited for study.

3. The need of the online learning is very high. The needs of the learners are running fast into online learning network and the network must be ready, computer were installed, and other necessary network utilities, The convenient network programming to accesses of the ease to understand of the training, and an advice and guidance of the online training.

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Self-Education in the Management of Micro-Finance Provision in the Gambia

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ABSTRACT

In 1916, John Dewey wrote:
"It may fairly be said, therefore, that any social arrangement that remains vitally social, or vitally shared, is educative to those who participate in it. Only when it becomes cast in a mold and a run in a routine way does it lose its educative power."

The work of women's groups in The Gambia (which is one of the poorest countries in Africa) who are involved in implementation and utilization of micro-finance is an example of a 'social arrangement (and self-determination) vitally shared' and it is instructive to examine its 'educative power'.

Such an examination was undertaken during September 2008 by the main author of this paper and he reported on it when he returned to Khon Kaen to complete MRDM (the in-career MA in Rural Development Management) at KKU.

EDU-COM 2008 aimed to enquire into 'Directions for Change' to achieve 'Sustainability in Higher Education'. Top of its list of themes was 'Community as a Resource for Sustainability', amongst whose sub-themes was 'transforming communities through higher education'. One direction in which change may well occur is the examination of examples of self-education far from the ivory towers of academia and the reporting of those examples via the higher(?) education system.

This paper is one early small step in that direction.

Key words: self-education, women's groups, micro-finance, The Gambia, Khon Kaen, Thailand.

INTRODUCTION

This paper takes up the Conference Announcement's sub-theme of 'transforming communities through higher education' within the larger theme of 'community as a resource for sustainability'.

In its 'Discussion' section, it looks at the big event (decreasing availability of fuels and feedstocks) to which all communities will have to adapt and transform themselves, and one way in which the higher education system may be able to help some communities to get from their particular 'here and now' to their 'there and then'.

First it looks at where is 'there' by considering the emerging issue that will compel change from their 'here' to 'somewhere else' for all communities. Then it looks at one example of a family of resources (indigenous organizations set up by the self-educated) that are available to be studied in the communities that have developed them. Present-day practitioners in higher education can study them. They can promulgate them to a wider set of communities in their futures.

The example of an indigenous organization originally set up, and continuing to be managed, by the self-educated is GAWFA (The Gambia Women's Finance Association).

As far as is known by its authors at the time of the writing of this paper, the inception of The Gambia Women's Finance Association (GAWFA) is an illustration of the advancement of knowledge without any input from any universities or from any university graduates. In fact, some of the leading thinkers and actors in envisaging and developing the initiative had not even had schooling at primary level.

Whilst collecting data as part of a case study of GAWFA in two Divisions of The Gambia to add to understanding of the effectiveness of the microfinance institution in rural poverty reduction, enquiry was made into the self-education of its originators and its present-day organizers to enable them to meet their managerial and operational challenges.

The economy, geography and history of The Gambia

The Gambia has a wet-period/dry-period tropical climate characterized by minor hills with savanna in the uplands and swamps in low land areas. With a developing market economy, The Gambia depends largely on the production and exportation of groundnuts and its by-products even though only 28 percent of the land is arable. It also re-exports imported goods to other African countries. Approximately 75% of the labour forces are engaged in agriculture and 50% of those are women mainly involved in subsistence farming based on the cultivation of rice, millet, sorghum, corn and cassava.

The Gambia consists of two long, narrow strips of territory lying along the northern and southern sides of the river Gambia in West Africa. It extends upstream from the mouth of the river Gambia for approximately 300 kilometres from its capital Banjul (13.5N, 16.5W). Measuring approximately 70 km wide, it forms an enclave that penetrates into Senegal from the North Atlantic Ocean. Its population was estimated to be 1.7 million in 2005. Its official language is English and other languages in use are Creole and several indigenous languages of which Malinke is the most common.

The Gambia was created as a British colony in 1843, and became an independent member of the Commonwealth in 1965 and a Republic in 1970.

Poverty in The Gambia

Increasing poverty in The Gambia is affecting all, but particularly women and children. One of the responses to this among others has been the establishment of Microfinance Institutions such as The Gambia Women's Finance Association (GAWFA) and the time is opportune for a critical study of its progress to date. Poverty is one of the most outstanding social phenomena that, one way or the other, affect the people of The Gambia. It especially affects the rural women who have little or no access to formal financial institutions. Being one of the world's poorest countries, seventy percent of the population lives below the World Bank poverty threshold of US$1.00 per person per day. The Per Capita Income according to a 2006 estimate (http://www.infoplease.com reviewed in March 2008), was US $356, one of the lowest in Africa. With an annual population growth rate of 4.1% according to the 2003 population

census, the economic growth rate is only 7% as estimated in 2006. The agricultural sector where both men and women are actively involved has been gradually affected by an inconsistent rainfall pattern mainly attributed to global warming and the wanton destruction of forest cover. Apart from the inconsistent rainfall pattern, the agricultural sector is also encountering a significant labour shortage which is attributed to the high rate of rural urban migration and low economic returns.

Due to the above situations, the agricultural activities in most rural communities of The Gambia (particularly in upland areas) which are the cultivation of cash crops such as groundnuts, cotton and maize, have been seriously reduced. A great deal of farm land in most areas has been abandoned mainly due to limited source of labour and lack of incentives in traditional farming among others. The poverty situation becoming more and more exacerbated despite numerous efforts by the government and its closest allies. According to an official report in November 2006, an integrated housing survey disclosed that the poverty rate of the Gambia is now 75 percent. That was 5 percent more than what the World Bank had projected previously. In order to overcome this situation, both the government and people of The Gambia must act more swiftly to avoid a national disaster. The worst affected by the poverty situation are the women and children. The major food crop rice is produced by the women yet they are the most marginalized in terms of access to facilities such as farm implements and loans. Even though most households in The Gambia are headed by men, the general up-keep in terms of feeding and looking after the children's welfare are conferred on to the women. On the contrary, the right to property and decision-making are mostly denied to the women. The right to decision making, especially in the rural communities where the traditional system of family and household management prevails, is associated with men rather than women.

The people of The Gambia spend almost seventy percent of the income on food and forty percent of that amount is spent on rice. Out of the total rice consumed in The Gambia, 65% to 75% of the supply is being imported. It comes mainly from Southeast Asian countries like Thailand, Vietnam, and China. The issue of the high cost of rice is formidable considering rising world prices, and the distance of shipping. Since the high price of rice to import has arisen from the dramatic increase in oil prices and the global economic recession, the outlook is grim.

The Gambia Women's Finance Association (GAWFA)

GAWFA is an institution which, over the years of operation, has clearly demonstrated commitment to providing micro credit capacity building to women and commitment to advocating on behalf of its members on pertinent issues and concerns that affect their lives. GAWFA has developed its own model of microfinance that emphasises the recognition of pro-poor sustainable economic growth as a basis of all efforts to reduce rural poverty. The model entails an operational strategy aimed at providing financial assistance to its members under four different categories, namely Large Group Credit Scheme, Individual Credit Scheme, Solidarity Group Credit Scheme and Voluntary Credit Scheme.

FINDINGS

The findings revealed that, apart from responding to the financial needs of the rural poor and the poorest of the poor in remote rural communities, GAWFA also provided services with social dimensions which greatly contributed to the socio-economic development and empowerment of its beneficiaries.

Credit access is one of the major challenges that most microfinance institutions faces. The research findings have revealed some appropriate measures that GAWFA has adopted especially during the last three years in order to enhance its member's access to credit. Such measures included the introduction of various credit schemes as well as expanding its program which led to the opening of three new branches

The participation of women in microfinance to improve their socio-economic conditions and the gradual development of their own association that has being in existence for more than two decades was observed.

The aspect of Self-education in the implementation of microfinance in The Gambia by the women and how they gradually transformed themselves to an organized institution that is able to again international recognition and support is in an achievement worth emulating.

The women of GAWFA were able to define for themselves a mission which is aimed at breaking the cycle of poverty through various means including Self-help, training for capacity building and proper management of all kinds of activity. Based on the information gathered during the research, the beneficiaries of GAWFA, especially the women in remote rural areas, have realized for themselves the need for not just diversifying their activities but to also link them to sustainable income generating activities and skills that could earn them regular income. The in-depth interview that the researcher conducted with 16 of the beneficiaries in the study area has shown that a reasonable number of them took loans to purchase basic materials that enhance the operation of their enterprise. Economic activities as envisaged by women are therefore not only limited to crop production such as the cultivation of rice and groundnuts as seen to be fundamental in the farming communities of The Gambia. One may ask the question whether the women can do it all by themselves? Development as a relative term is a painstaking adventure that requires a combination of and means efforts. The women of The Gambia like women elsewhere in Africa needs a lot of support and assistance from not just microfinance institutions but also from the government as well. The present situation faced by the Gambian farmers is a difficult one in a country where almost three out of every four families are farmers with 50% of them being women. As envisaged by the women themselves, widening the spectrum and linking their activities to viable skills may not be a panacea, but in the context of rural poverty reduction it is a step in the right direction.

When compared to other microfinance institutions that operate in The Gambia, "GAWFA has the strongest institutional capacity in terms of manpower, policies and procedures as well as structures" was a statement made by the General Manager.

From the information gained, a few underlying factors may be seen as the main reasons for the sustainability of GAWFA. The women of The Gambia had come a long way prior to the establishment of GAWFA. The informal, self-educated, model of microfinance that the women were implementing at the village and community levels was seen by them to be a product of their self-determination and that made them keen on GAWFA being a formalized agency of the women and for the women.

The invaluable service rendered by its staff to the beneficiaries as commended by the women themselves could be another reason. The trust and confidence the women build in the management team and the timely responses it gives to its members when and when required can also be seen as a major factor.

GAWFA's ability to create a well coordinated institutional relationship with agencies such as WWB (Women's World Banking), TANGO (The Association of Non-Governmental Organisations), and GAMFINET (Gambian Micro-Finance Network,) and by securing grants from the governments of France and Taiwan were pertinent to its sustainability.

Member education activities are still ongoing with a great deal of focus on the right of the women in the household but the nature of Gambian women in general and the Muslim communities in particular have to a greater extent moulded most of the women to be subservient to their husband. Therefore, the power of religion should not be underrated despite the remarkable progress the women were able to achieve on their own and the high level of awareness promoting economic growth. While the list was not exhaustive, the fact that some of the groups' executive members also capitalize on group loans was equally an important challenge to be overcome by GAWFA. Loans were usually applied in the name of the large group when in

reality only few of the top members of the association are those who needed the money to expand their businesses. At the time of disbursement, every member of the group would be subjected to sign against her name as genuine beneficiaries, having physically handed over the money to each member, and they in turn hand it over to the top executives as already decided.

What has become important to the women of The Gambia is the fact that GAWFA, unlike most micro-finance institutions is considered by its members as their own. It has been created on the bases of their needs and on the pillars of trust, confidentiality, and above all the respect for their social capital. Social capital is fundamental in the successful and sustainable implementation of any community-based organization. The history of GAWFA has shown that its successes emanates from its members ability and understanding of the need of establishing their own association which they were able to learn and gain experience through self education and self determination.

DISCUSSION

Over the past fifty years, many countries have been transformed or partially-transformed. For instance, Thailand has experienced a build-up of significant industrial capacity and industrial activity, with extensive rural-to-urban migration. There is now a widespread realization that industrialism is dependant on being supplied with inputs of exosomatics (fuels and ores from within the Earth) and that these are not inexhaustible.

Figure 1 shows, in a smoothed and stylized form, the extraction of the exosomatics against a base of 4000 years, from 2000 years in the past to 2000 years in the future.

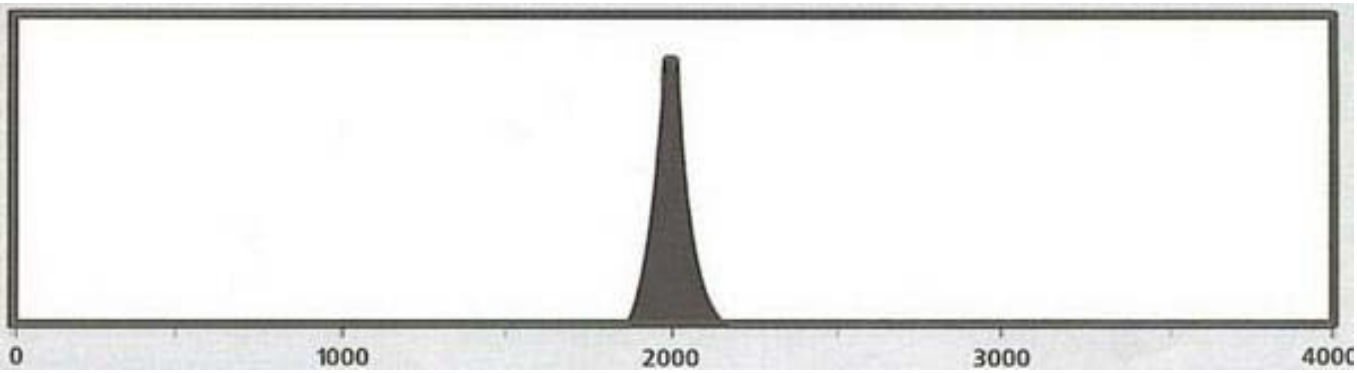

Figure 1: The extraction of the exosomatics

The ordinate axis of Figure 1 has, deliberately, no scale. Figure1 is the graphical presentation of a concept, not of a table of figures.

If the concept is used to plot any particular quantity, the pulse can be expected to be narrower or broader, shifted left or right by a few years and made irregular by fluctuations in demand for the commodity, caused by economic conditions due to wars or recessions. However, the plot for any exosomatic quantity will not look substantially different from Figure 1.

Suggestions abound for a name for the width of the top of the peak. Possibly the most expressive is “The Concordes Years”. Starting in 1976, it was possible to board an aircraft in London or Paris and arrive in New York four hours later, travelling across the Atlantic at around 2000 km per hour. This service, provided by British Airways and Air France, was withdrawn in 2003 when it was clear that the fare charged was rising so high, due to the price of oil, that there were too few customers who would pay it for

the operation to be economic. The Concordes fly no more. They are now static exhibits in museums of aviation history.

Figure 2 shows Figure 1 adapted to show just coal (shaded grey) and oil (shaded black).
Before A, there were no significant supplies of fuel except wood.

A is approximately 200 years ago, when the steam engine, that had been invented by Newcomen and vastly improved by James Watt, came into widespread use to burn coal from newly-discovered deposits and drive the pumps that lifted water from the mines and allowed extraction of coal that lay below the water table.

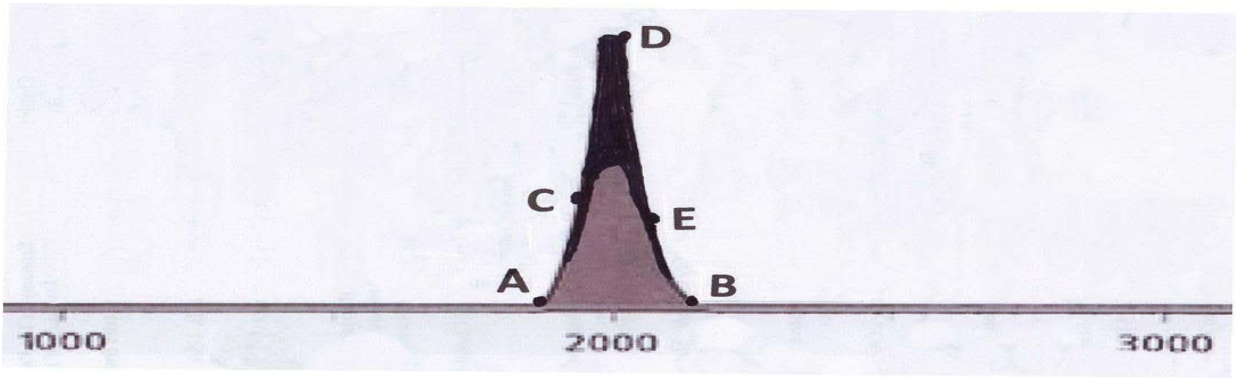

Figure 2: Coal and oil, retirees and initiates

Figure 2 was first prepared for a presentation to some of today's soon-to-graduate engineers. C marks the start of the career of an engineer who is retiring now. D marks the retirement of that engineer and also the start of the career of today's young engineer. E marks the time of retirement of today's young engineer. The figure was prepared as a way of showing that the times of today's young graduate will be as changeful and challenging as were those of their predecessors, but with a big difference. The next generation of engineers will be continuously challenged to work with less and less exosomatics, whereas their predecessors worked at making use of more and more.

One major direction of change is going to be towards less and less transportation of goods and people. "Localisation" is the popular term for the result of that, with 'locavores' being people who eat locally-grown food. That was the case until a time between A and C when steamships started moving food across oceans. There will be much examination of what indigenous methods were developed to produce necessities locally in the pasts of various communities, and what social organisations were developed to 'manage' local societies.

Higher education institutions, albeit much changed from today's ones, may have a role in those examinations and promulgation of their results. Any young university teacher, in any discipline, might serve herself/himself well to take up the broader study of such indigenous technologies or practices that lie in their field, rather than to follow the past practices of narrowly-specialist research, which may well be nearing obsolescence.

CONCLUSIONS

The case study carried out in The Gambia did reveal, and give some insight into, an indigenous development of a community service in which the administrative and managerial challenges had been met as they came along, without any input from people who had previously undertaken formal courses of study in business administration or management.

When Mr Ceesay's thesis is completed it will be one piece of the literature of micro-finance that may be of encouragement and guidance to others. There remain other aspects of GAWFA to study so this is a 'work in progress'. But so was all life, always.

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Improving Student's University Life Experience As Sustainable Competitive Advantage In International Higher Education: A New Zealand Study

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ABSTRACT

Increased competition for public education funding, comparative "shopping" by prospective students, and parents, alumni and stakeholder concern about reputation and rankings have resulted in universities taking a more market-oriented approach to improve student enrolment. This has led to a switch from the traditional model of pedagogically-oriented new degree development towards one which focuses on student numbers as its primary objective. However, strong reservations about commercial practices and approaches in campuses are still felt at many universities. This research proposed and proceeded to provide empirical evidence that improving a student's university life experience leads to a strong alumni-university relationship, alternative strategy to achieve sustainable competitive advantage in the export (tertiary) education industry.

LITERATURE REVIEW

The dramatic globalisation of the world economy over the last two decades has an impact on higher education. Where once universities competed for students, faculty and funds within a national context, today they compete internationally. An outcome of this competition is that universities are taking a more market-oriented approach to improve student enrolments, and have begun to acknowledge the growing expectations of students and the competitive benefit good service can offer (Small 2008).

There is evidence to suggest enrolments or choice of international tertiary education is influenced by personal recommendations or word-of-mouth referral of former alumni (Mazzarol and Soutar 2002). In the US in 2004, private donors including alumni gave £10 Billion to universities (Wooldridge 2005). Donations from alumni and the private sector had been a major source of income for well established universities such as Harvard and Oxford because of their strong alumni network. As such, a strong alumni-university relationship is an asset to any university.

RESOURCE BASED VIEWS OF A FIRM

According the "Resource Based View" (RBV, Wernerfelt 1984) of a firm, competitive advantage is created through deploying resources (assets and capabilities) that are heterogeneous across firms but where there are barriers to acquisition or imitation by competitors. Accordingly, sustainable advantage

flows from the possession and deployment of resources that are rare, imperfectly imitable and non-substitutable. Capabilities that set service firms apart from their competitors are based on intangible business processes, rather than capital equipment. Intangible assets such as unique competencies, customer and industry relationships (Eriksson, Majkgard and Sharma 1999; Lavie 2006) are sources of service competitive advantage. Developing competitive advantages by effective development and management of relationships are vital for the survival and success of businesses in modern global and turbulent environments (Lavie 2006; Miller 2003).

Within the university context, a strong alumni-university relationship can be a source of sustainable competitive advantage stemming from unique relationship between a university and its alumni. Universities can deploy relevant resources to enhance student's experience to ensure service satisfaction and future good alumni relations that hopefully can lead to their willingness in promoting and recommending their alma mater to their peers and family members.

CUSTOMER'S EXPERIENCE-DEFINITIONS AND CONCEPT

Carbone and Haeckel (1994, p. 1) define 'experience 'as 'the take-away impression formed by people's encounter with products, services and business as a perception produced when humans consolidate sensory information'. Shaw (2005) views "customer experience as an interaction between an organization and a customer (p. 51). It is a blend of an organization's physical performance, the senses stimulated and emotions evoked, each intuitively measured against customer expectations across all moments of contact". These definitions highlight the cognitive and affective elements of customer experience. Within the context of the market-orientated approach to education, a university's customer is usually their fee-paying student. Extending from Carbone and Haeckel (1994), and Shaw's (2005) definition of customer experience, student's experience is defined as a student's take away impression or emotions formed from their encounter with a university brand or their alma mater, as measured against their expectations of the university/alma mater performance.

Following **Berry and Lefkowith's (1988)** argument that the company name is the brand name in services, this research treats a university name as the university brand name.

RESEARCH OBJECTIVES

This research is aimed at first, identifying student's expectation of a good university experience. Second, whether a positive student university experience can translate into student's willingness to promote the university they attended (alma mater) to their peers and family members with respects to choice of international education. The rational of the second objective is that, if alumni are willing ambassadors in promoting their 'alma mater' to peers and family this becomes another channel for achieving sustainable competitive advantage in international tertiary education.

METHODOLOGY

An exploratory semi-structured in-depth interview was carried out to achieve the research objectives. The use of opened-ended questions have the advantage of allowing respondents to have the freedom to respond in their own way and not be restricted by the choices provided by the researcher as happens in closed question questionnaire surveys (Zikmund 2000). Thus, more information can be elicited from the interviewees.

The research employed a stratified snowball sampling strategy including student's recruitment agents and pre-university students from Singapore and Malaysia; and international students in the University of

Otago, Dunedin, New Zealand. It involved the respondents in each target group recommending others to be included in the sampling until the required quota in each target group is reached (as shown in Figure 1).

Personally administered in-depth interviews were used to prevent irregularities in interviewer style. Before the actual interview, potential interviewees were contacted via telephone or through an introductory letter requesting an interview at their convenience (time and place). During the initial contact, potential interviewees were told how their names were obtained, the purpose of this research, together with other relevant informed consent information (procedures involved, right of participants, confidentiality of records). All interviews were recorded and transcribed in their entirety. Analysis was ongoing throughout the data collection with notes and transcripts reread/reviewed for 'patterns and common themes' throughout as recommended by Patton (1990), allowing earlier readings to inform later readings. Overall, there were 36 respondents in the research.

FINDINGS

The research revealed that academic staff accessibility to respond to student's concerns; having knowledgeable and culturally sensitive front-line staff; and customised tutorial classes can help improve university life experience. All respondents indicated that having small customised tutorial classes and ease of accessibility to academic staff will help them learn more confidently because of more personal attention to their academic weakness. This will project an image that the university is concerned with their learning outcome. Accordingly, this image is important at the initial stage of their university education because it will help enhance their confidence/trust in their enrolled university brand. It assures them that they are at the 'right' university.

Availability of good student orientation programs to induct newly arriving students into campuses and countries is also another factor enhancing university life experiences. Specifically, sessions on improving cross-cultural communication skills for international students are highly appreciated. International students indicated that they are less willing to participate in large group discussion because of their 'poor' command of the English language and their lack of confidence in conversing with their fellow English speaking university mates. As a result they found comfort in clustering with their fellow Asian students. There was evidence that the presence of a large number of international students can influence a student's choice of international tertiary education because they provide social support to make student feel 'right at home' in foreign land.

Confidence/trust in a university brand is also strengthened when university staff shows that they truly care and are concerned about student needs during difficult circumstances, while not taking advantage of their vulnerability. Student support services that include counselling, accommodation and emergency funds for international students are cited as 'appreciated services' by 44% of total respondents. Accordingly, these support services, illustrate the university cares for its international students or take a market-centric approach towards its students. For some, the presence of senior staff (professor) at education fairs to answer queries about course admission starts the confidence building process in a university brand.

Congruency between what is advertised and the actual experienced also help build confidence/trust in a particular university brand motivating students to be more active participants in campus activities and to build emotional attachments to their university brand. As a result they are willing to participate in alumni activities after graduation, re-enrol in the college or university they attended (alma mater) and help promote their alma mater to their children, friends and colleagues. Improving student's university life experiences to strengthen future alumni-university relationships can be an alternative strategy to achieve sustainable competitive advantage in the tertiary education industry.

The strategy of improving student's university life experience to achieve competitive advantage was supported by the fact that 90% of the surveyed international students in New Zealand indicated that positive testimonies from ex-students influenced their choice of tertiary education. Amongst potential students in Singapore and Malaysia, confidence/trust of a university brand was greatly enhanced if the sources of the information are from alumni in their role as teachers, community leaders and bosses.

RECOMMENDATIONS FOR FUTURE RESEARCH

There are two limitations in this research which could be extended in future research. First, tertiary education in the context of this research is restricted to university brands in New Zealand. This could be extended to other tertiary education brands in New Zealand.

Second, further research should investigate how universities can deploy assets (staff, intellectual properties, patents, networks) to achieve competitive advantage through funds applied to research and scholarships; customisation and differentiated benefits to its stakeholders (current and past students, industry) to improve its brand image.

CONCLUSION

Empirical evidence from this research, revealed the viability of improving student's university life experiences as an alternative strategy to achieve sustainable competitive advantage in the tertiary education industry. Not only did improving student's university life experience improve the outcomes of learning for students, it help strengthen future alumni-university relationship, resulting in alumni willing to promote their alma mater to their children, friends and colleagues. This word-of-mouth publicity can help enhanced the image and confidence/trust placed in a university brand, differentiating it from the multitudes of other universities and colleges.

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Sampling target for in-depth interview	Quota		
	Malaysia	Singapore	New Zealand
Education professionals (academics, marketing personnel)	4	4	
Student's recruitment agents	4	4	
Potential students (pre-university student, working adults)	4	4	
International (university) students			12
	Sampling size (n=36)		

Figure 1: Target group quotas for in-depth interview (stratified snowball sampling)

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Web-based Assessment Systems in Educational Context: A Comparative Study

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ABSTRACT

Assessment is an indispensable part of curriculum. Any effort in this connection can help to give a useful direction to teaching learning process. Web-based assessment systems are widely used in assessment in educational context, specially designed for distance education, by checking the acquired knowledge and getting feedback. The goal of this paper is to provide a brief review of the work performed so far in this area. This paper discusses different web-based assessment systems and describes their main strengths and weaknesses and proposes some suggestions that are still required in the enhanced form of web-based assessment system. This work can provide useful information for the prospective researchers in the area.

INTRODUCTION

Assessment is the enquiry process that can be carried out statically and dynamically online (Nicole A., Buzzetto M. and Ayodele J. A, 2006, Reggie D., 2005). The relationship among assessment, teaching and learning shows that it plays an important role in assessment of student learning outcomes and teaching quality (Brown, G., Bull, J., and Pendelbury, M,1997, Brown, S. and Knight, 2006).

Educational assessment can provide a powerful tool to improve teaching and learning effectiveness. Information technologies have affected every aspect of human activity and have a potential role to play in the field of education and training, specially, in distance education. It can fulfil the need of learning anywhere and all the time by individuals and groups. Internet is a vast resource of Information and helps in promoting opportunities of knowledge sharing throughout the world, so it can be utilized in the area of education more responsively for self assessment.

NEED OF WEB-BASED ASSESSMENT

Using information technologies, students can decide about their studies, learning time, place and resources in a better way. Students can work in more supportive environments, especially using web-based assessment systems. Web-based assessment plays an important role in appropriate placement of students. It also helps in analyzing learning problems faced by students. It encourages the teachers to improve their teaching skills. It also helps in restructuring teaching and learning process. In yester years, a variety of assessment approaches and systems have been proposed, and as information technology keeps improving, numerous of them have been transformed from traditional paper-and-pencil to computerized and web-based format in recent years (Lei He, 2006).

TERMINOLOGY

Computer-assisted assessment (CAA) refers to the use of computers in assessment. The term covers the use of computers to design, deliver, mark and analyse assignments or examinations. It also includes the collation and analysis of data gathered from optical mark readers. CAA is often referred to as Computer-Based Assessment (CBA).

METHODOLOGY

Vast literature in the web based assessment was reviewed. Many systems have been development for the sack of assessment but this work was focused on analysis of those systems which were meant for assessment of student's progress in their learning. Therefore many other systems were excluded from the analysis whose aim was curriculum assessment or other domain.

DATA SOURCE

The information taken into account in analysis were drawn from the work already completed on each system separately and no personal experience and observations on the systems have been recorded in this work.

FRAMEWORK

Different web based system have different features but for comparative analysis of the systems in this paper four parameter have been taken to work with. These four parameters are security, flexibility, feedback and user friendliness. The consideration in selection of the parameter was suitability in educational context and also they are the often found and desirable features in any system in the field of information technology.

Security was defined according to the criteria of John Brainard et. al. with labels of level 1, level 2 and level 3. Level 1 security is that which depends on the passwords only and is defined as something you know. Level 2 security is defined as something you have e.g. credits, hardware token
Similarly level 3 security is defined as something you are e.g. biometrics, fingerprints etc.
Flexibility was given binary value of 'Yes' and 'No'. This was because no standard bifurcation of the flexibility could be found in the literature.

Feedback was given different labels due to variety of response given by different systems and the labels are self explanatory.

User friendliness was categorized as 'More' if the system was easy to use for example giving graphical user interface and 'Less' when the system was not easy to use. System was given label of 'personalized' when it was reported to be changed according user requirement.

For the sake of ease the following nine systems were considered for analysis.

EXISTING SYSTEMS

1. CyberProf

CyberProf is World Wide Web-based system, support password base authentication. It can be used to access the lectures, quizzes, homework, grades, progress and their submission in different format and

process the inputs for the assessment of students. It gives main focus on student directed learning for deep understanding of concepts in sciences, mathematics and engineering. It supports "hint" as well as "help" mechanism to provide useful information to the students, if requested. It encourages an accurate grading scheme for its interactive problems. It provides variation of same assignments by generating random numbers. One of the key features of it is the use of Network TA, a conferencing system. It is very user friendly and provides a lot of help materials relevant to the scenario. It is very flexible in sense of updating a variety of information. It provides good student support and feedback (Deanna M. et al, 2007).

2. Cecil

Cecil is a reliable, responsive, and flexible system, developed by the Business Education On-Line Unit of the Auckland. It is used for teaching and assessment in the academic and professional environment, designed and built using a fully documented data model with CASE and used "n-tier" architecture. For the sake of security, sockets, encryption and bio-sensing devices can be implemented. The key feature of Cecil is its user system interface consists of student s and instructors interfaces, which are very user-friendly and easy to use. Teachers can store all their teaching materials in a single place and can be shared with students. It enables students to complete their studies in a proficient manner by providing immediate, guided feedback in different forms (Lesley Gardner, David White, 2001).

3. WEAS system

The WEAS system is a modularized system with an open architecture and Bloom's taxonomy, which consists of autonomous modules with diverse objectives and functions. This system gives importance to prompt feedback, precision. The interfaces among the system modules are consistent in public, thus old-fashioned modules can be removed and new modules can easily be inserted into the open system for upgrading or enhancement. This System presents a web based learning assessment system to get to the bottom problem and to assess student learning outcomes and teacher instructional practices in valid time. The system performance is rather encouraging with experimentation in science and mathematics courses. This system also provides feedback such as the assessment of results to instructors and students for compulsory improvements on teaching and learning, thus facilitates both teaching and learning. This System is programmed in JavaScript, Microsoft Visual Basic.NET 2005, SQL server 2005 (Lei He, 2006).

This system consists of two-tier client-server model, the 1st is the web clients (the system administrators, students and instructors) who log into the system through the Internet, and the 2nd is the web and application server and the database server. This system is a two-tier client-server model, so it will face the problems regarding performance, flexibility, maintainability, reusability, and scalability, while hiding the complexity of distributed processing from the user (Utah, 1998)

4. WBLP System

Web-based learning portfolio (WBLP) system is used for genuine assessment, to help to store record, put on show, and scrutinize student learning process. It gives importance to portfolio assessment over other common assessments. The functions of the WBLP system are Portfolio creation, browse, guide, discussion board, suggestion board, student data maintenance, and system management. Database used in the WBLP includes student portfolio database (student basic data table, portfolio data table, and course work data table), discussion database (topic data table, article data table), and bulletin database. The creation of the WBLP system integrates portfolio rationales and Internet technology, authentic enough to serve the learning needs of the students (Chi-Cheng C., 2002).

5. WATA System

Web-based Assessment and Test Analyses (WATA) system is used for teachers education. The core program of WATA system is programmed in PHP and Perl and connected with MySQL to handle enormously large data sets and analytical programs efficiently. It works on a model known as Triple-A Model (assembling, administering, and appraising).which presents the most comprehensive form of CBT or WBT and is more suitable for teacher's education.

Assembling: To create item pools, test them, and organize for tests.
Administering: To allot that test items and item choices randomly to test takers; also provide personal identification numbers (PINs) and credentials for test takers to apply for test through Web.
Appraising: To analyse the collected data of tests and to generate the statistic report.

The WATA system is designed as WBT, so users have to use a browser to access the WATA system over the Internet (Wang T. H., Wang K. H., 2004).

6. CAPA System

The Computer-Assisted Personalized Approach (CAPA) is used for assigning homework. Instructors can easy create problems set with variables that can be randomized and modified for each student. It emphasizes on conceptual understanding. Its main functions are automatic grading, recording keeping, online statistical analysis, feedback and discussion forum on the web. Student activities, on CAPA are routinely recorded. Supplementary information about the students and their behaviour, were obtained through surveys and institutional data. The CAPA data permits analysis of student's accomplishment with respect to various events of homework. For future study it would be worthwhile to examine such behaviours in connection with other factors which are related with learning e.g. learning styles, attitudes, ecological variables, and learning strategies and methods (Paul W. and Hunter W. 2000, Kotas P.M. and Finck J. E., 2002).

7. Companion Website

Companion websites uses important texts, catalogs features and evaluates important materials regarding course work in introduction to computer literacy. The list of materials on companion website includes most important texts that cover the Introduction to computer science literacy. The selected texts are based on their sales volume and some are the top-selling available books. Texts for analysis in the introduction to computer science-literacy were taken from searches of highest sales numbers of computers and computer literacy. Available catalog on websites may help new faculty to teach a course for the first time. Outlook allows the instructor to publish online test for practice, quizzing and final tests (Kashy E., et al, 1993).

8. Course Management Systems

Course management systems (CMS) makes available a set of tools for creating virtual learning environments that can easily be used by teachers and students. It provides access to courses, monitoring learning process. It enables to focus on the specific need of a student by using student progress reports. CMS software makes developing a course easier. In the world of CMS, there are two options; proprietary course management systems such as WebCT or Blackboard, or open source course management systems such as Moodle or Claroline (Corey d'E., 2004).

9. EVAWEB

It uses the X.509/PKIX infrastructure, digital signature and three-tier architecture. EVAWEB is a Web-based assessment system that can be used to manage users (students and teachers), tests and problems, and to create the students' public key certificates. Apart this, EVAWEB guides the students in generating signature key and public key certificate using X.509/PKIX infrastructure. It also provides the facility of conducting web-based tests and to check for students grading. The students are directed to sign the web-based tests before submitting them to the server. EVAWEB acknowledges the students with a signed answer containing the grade. So every signed message can be used by the receiving party as non-repudiation confirmation (Ana I., 2007).

An analysis of the results shows that students evaluate the integration somewhat positively, but more work requires to be done to enhance EVAWEB's user-friendliness and usefulness, in understanding target technologies. Improvement of different aspects will enhance its effectiveness e.g. the trust of students on EVAWEB and the learning capabilities of the system. Some expectations task can also needs to improve e.g. system's functionalities, usability, security, and increasing learning capabilities.

COMPARISON

S#	System	Security	Flexibility	Feedback	User Friendly
1	*CyberProf*	Level 1	Yes	Intelligent & Quick	
2	Cecil	Level 3	Yes	Diagnostic	More
3	WEAS	Level 1	Yes	Prompt	
4	WBLP			Peer	
5	WATA	Level 1	Yes	Active & Simple	Personalized
6	CAPA		Yes	Immediate	Less
7	Companion Website		Yes	Immediate	More
8	CMS	Level 1	Yes	Quick	More
10	EVAWEB	Level 3	Yes	Quick	

FINDINGS

Feature wise analysis of different systems of the above given assessment system shows that feedback and flexibility is the most available feature in all systems while user friendliness is the least one followed by security.

System wise analysis of the above table shows that WATA and Cecil are better systems with highest level of security, personalized user environment, more flexibility and active and simple feedback. Cecil has edge over its counterpart in the feature of feedback as it provides diagnostics feed which is highly desirable in educational context. The assessment purpose is often diagnostic whether it is students, curriculum or teacher. Cyberprof also provides intelligent feedback but it is not user friendly and thus is not easy to use. WBLP is the least featured systems.

Many of the above discussed web-assessment systems lack security of the data during the session and server protection from "hackers". Non repudiation; participants cannot deny of their involvement in the exchange of information. Authentic assessment of educational achievement directly measures the actual performance in subject area. Instant and personalized feedback can be used to assess the web-based response experience, to identify problem areas, and to develop appropriate solutions.

DELIMITATION

As mention before the analysis is based on the analysis of already done work and personal experience of the systems were not included because the researchers have no personal experience of the systems. Also the system was delimited to the above nine systems.

CONCLUSION

Most of the above discussed web-assessment systems lack confidentiality; securing of the data during the session and server protection from "hackers". Non repudiation; participants cannot deny of their involvement in the exchange of information. Authentic assessment of educational achievement directly measures the actual performance in subject area. Instant and personalized feedback can be used to assess the web-based response experience, to identify problem areas, and to develop appropriate solutions. Compatibility is also of great concern especially across platforms. The effectiveness of an assessment by using a specific system must also be valuable to other systems. Another important aspect is Interactivity; the degree of responsiveness, a communication process in which each message is related to the previous and preceded message. Similarly usability; deals with how well a system satisfies user needs and requirements.

The main theme of this research paper was to provide a single platform for the researchers about the online web based assessment systems. For future study it would be fruitful to examine the comparative study of online web assessment systems involving more intensive variable and with reports from user with hands on experience.

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Multiple Perspectives for Sustainability in Education: Inside the Chinese Literacy Education for Immigrant Women

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INTRODUCTION

This research presents the results of three teachers that address two research questions: (1) How do literacy teachers for immigrant women in Taiwan enact and deal with different components of subjectivity? (2) In what ways do literacy teachers advance or hinder immigrant women developing their subjectivity? This study explores teaching practices of three literacy teachers in Taiwan. The paper draws on a wide socio-cultural perspective to examine the interactions between the students and their teachers. It will also look at the development of subjectivity in students' learning, how these literacy students make meaning, and how their subjectivity might be influenced by three teaching approaches.

Zhang (2003) admitted that Taiwan's literacy education for immigrant women is to sustain the structure of society by establishing a sense of identity for each individual member. With an agenda of homogenization, the role of literacy teachers is to ensure that these immigrant women understand, embrace, and preserve beliefs, social norms, and values at the expense of their own subjectivity. The socialization process is difficult for immigrant women in Taiwan. Zhang (2003) pointed out that families of these immigrant women and government officials fear mastery of privileged academic knowledge and fulfilment of individual development, especially in critical thinking. The see academic knowledge and individual development threatening the very foundation of the society and the family structure.

Egan (1997) asserted that Plato's doctrine of education is to enable students to master a body of privileged knowledge and to see the rational truth through vigorous academic disciplines. As a result, the success of a student is measured by how much privileged academic knowledge he or she attains.

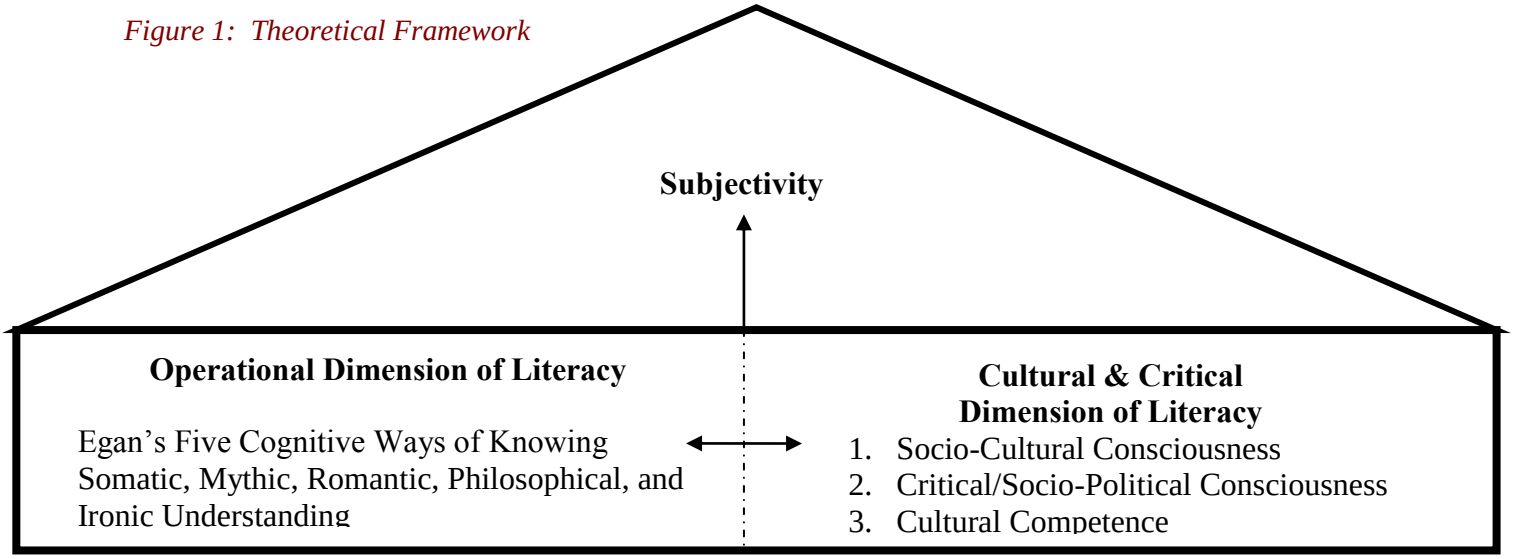
Egan (1997) stated that a student-centre approach comes from Rousseau's idea of individual development in education. A student's success is not measured by the best idea he or she can ever get. The teacher's role is to maximize the potentials of students by facilitating their discoveries and developing their use.

Socialization, truth/knowledge seeking, and individual development are not compatible in education. Egan (1997) claimed that if socialization is normative in education, it might overstress functional ability and sacrifice truth/knowledge seeking and individual development. The dominance of socialization in education results in clashes over the knowledge/truth seeking and individualism. Overly emphasizing the full grasp of knowledge and discovery of reality can lead to annoying revolutions, the overthrow of authority and the rejection of tradition. The learner-centered curriculum might end up inconsistent with other educational objectives. For instance, socialization might be denied or delayed if it is contradictory to self-development for learners. If learners are not interested in mastering bodies of knowledge, truth seeking can cease. The ends of education become problematic because schooling may contradict a democratic and liberal education of individualism. Therefore, Egan's task of developing adequate language abilities is aimed at expressing a unique imaginative consciousness.

AN INTEGRATED PYRAMID MODEL

My interest is how Taiwan's immigrant women develop subjectivity. In a broad sense, subjectivity is thought to a subject's viewpoint involving mostly attitudes, mind-sets, and needs. In contrasting to common knowledge or principle, subjectivity is sometimes referred to as individual viewpoints and ideas. Subjectivity is frequently distinguished from objectivity in philosophy. Subjectivity is seen to be the particular perceptive understanding of any parts of one's personal experiences. To understand subjectivity, I need a comprehensive, complex, and integrated theoretical framework. I began with Egan's model as I developed my theoretical framework. Gee, Freire, Ladson-Billings, and Gay are referenced in discussing the nature of education or its limitations.

Figure 1: Theoretical Framework



The objective of education as suggested by Egan is to let immigrant women follow their innate intellectual developments as natural ways of sense-making, because all human beings grasp meanings of the world through these five common cognitive lenses: Somatic understanding— children make senses of the world through their physical bodies before language development by hearing, seeing, smelling, and modelling the social structure in role-plays and games; Mythic understanding—people who lived in the ancient oral cultures comprehend the world through narrative stories and abstract concepts such as binary structuring or liberation versus oppression to help their memorization; Romantic understanding—every individual has the ability to be affectively engaged and transcended beyond the constrains of convention and reality; Philosophic understanding—to understand the world through a general coherent scheming and alternative theoretic thinking; and Ironic understanding—to recognize one's limitation of philosophic generalization.

Freire (1970) reasoned that the aim of education is to enable individuals in developing a critical consciousness toward self and toward the environment where he or she is situated. By developing this critical consciousness, a socio-political version of critical thinking, the oppressed can reshape his or her subjectivity and re-enter the society, or be re-socialized, without being silenced and sacrificing identity.

The task of education is "using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them" (Gay 2000, p.29). Cultural competence, defined by Ladson-Billing (1995), is to affirm the cultural origin of culturally diverse students, making minority students feel accepted, respected, and welcomed in the mainstream classroom.

Gee (1996) maintained that socio-cultural consciousness is viewing social issues beyond the personal level and to situate socio-cultural phenomena within macro-level social and political contexts. In the widest sense, a narrative approach is grounded in socio-cultural theory (Moen 2006). Narratives are key thesis about the role of letting people talk and expressing their views and the role of subjectivity. A narrative approach emphasizes individuals who attach meanings to their personal socio-cultural experiences via their storytelling. Narratives are also aimed at capturing both the individual level and the larger socio-cultural context within the stories that one tells.

THE RESEARCH STUDY

The research questions: (1). How do literacy teachers for immigrant women in Taiwan enact and deal with different components of subjectivity? (2). In what ways do literacy teachers advance or hinder immigrant women developing their subjectivity? The "what" question is intended to follow the naturalist approach by looking for thick descriptions on people as they are externally present and reveal their observable behaviours and lifestyles. By contrast, the "how" question is designed to follow the constructivist approach by centering on how subjectivity is constructed within the sociocultural-critical paradigm. Even if both the naturalists and constructivists are mostly concerned with people's everyday lived experiences, the naturalist tends to view things as external truth. However, for the social constructivist, because the socio-cultural world is continually undergoing making process, the focus is on the meaning producing practices of the socio-culturally constructed world (Gubrium and Holstein 1997).

Data sources in this study are three segments of interview texts from three literacy teacher participants—Gwen, Hannah, and Yvonne (pseudonym). Yvonne and Hannah are colleagues in their school. Gwen is a teacher from a different school, but in the same district with Yvonne and Hannah's school. As a native Taiwanese, Gwen grew up speaking the Taiwanese language. Gwen, now almost sixty years old, became involved in the evening adult literacy program about ten years before she retired from teaching the Chinese language for elementary level children. Although Hannah was in her early thirties and had been teaching only five years, she had become a senior fifth-grade teacher. She was a bit nervous that I was observing her in the very first class she was teaching for immigrant women in the evening literacy program. Yvonne had taught six semesters of evening adult literacy program and, despite being in her early thirties, was considered a senior literacy teacher for immigrant women.

I employ a narrative approach to elicit and tape-record stories heard in interviews. In the widest sense, a narrative approach is grounded in socio-cultural theory (Moen 2006). A narrative approach emphasizes individuals who attach meanings to their personal socio-cultural experiences via their storytelling. Narratives are also aimed at capturing both the individual level and the larger socio-cultural context within the stories that one tells. Just because a study cannot apply its results beyond itself, does not mean it does not have the basis for generalization. A narrative could be a short bounded segment of interview text (Riessman 2008), I conducted three brief interviews, one each with Gwen, Hannah, and Yvonne. Questions were constructed so that they would draw narrative stories from the interviewees? I did not ask questions that required rigid or standardized answers. I asked questions that were open-ended, requiring interviewees to share more information I did not want the theoretical framework to dictate the content of my interviews. Since the theoretical framework did not guide the interviews, I did not have to worry about interviewees straying from the topic. Instead of academic language, I used everyday language and listened carefully to interviewees as they expressed events from their lives in their own words. I did not want to restrict responses from my interviewees in any way because I wanted them to share as many narratives as they were willing to express. This method provided more meaning to the data for my study. I reminded myself to engage interviewees on a personal level and respect each interviewee as a person, instead of a research resource or object. To keep them sharing their stories, I paraphrased their responses and created a smooth transition letting them share what was important to them regarding their teaching or learning. They spoke in Chinese and I have translated their interviews into English.

Data Analysis

The first stage of data analysis is thematic analysis. I adapted from Cain's strategy of thematic analysis (see Riessman 2008): conduct textual analysis by noting main points (MP); episodes and events and turning points (TP); propositions (Prop) made about main points. I look for reappearances, such as propositions reappear as thematic or taken for granted assumptions and guidelines for describing what happen. Episodes/events reappear as predictable sequences. I identify common patterns of assumptions from reappearing propositions and common sequences from taken for granted assumptions. In this current study, data are analysed and coded utilizing thematic analysis through eleven lenses, Egan's five cognitive tools, socialization, truth/knowledge seeking, individual development, Gee and Village's socio-cultural consciousness, Freire's critical consciousness, and Ladson-Billing's culturally relevant/responsive pedagogy—cultural competence. I constantly compared and contrasted the theoretical framework and data to determine if some interviewees would emerge in the roles of social worker, Rousseau, or Plato. I reported that only if it occurred.

The second stage of data analysis is structure analysis. I adapted from Labov's approach of structure analysis by drawing out the sequence of speech acts used to narrate a story. The sequence of speech acts is unanswerable via a thematic analysis alone. I employed the way in which Labov codes the data based on the function of particular clauses in the overall structure of the narrative (Riessman 2008, p.89):

AB provides brief synopsis of the story and/or its point
CA carries the action forward – the complicating action
EV commits to the meaning of the even for the narrator (evaluative type comments)
OR provides information about the setting and characters
RE Resolves the narrative

Below, I have transcribed and thematically coded the tape-recorded interview texts from Gwen, Hannah, and Yvonne about their teaching approaches.

Gwen
Question: Tell me about your background? What is your ethnicity? What language is your native language?

As a native Taiwanese, I grew up speaking the Taiwanese language *(Event: Gwen has been speaking Taiwanese for years)*. I, now almost sixty years old, became involved in the evening adult literacy program about ten years before I retired from teaching the Chinese language for elementary level children *(TP: Gwen started to involve in evening literacy program)*.

Question: Tell me how you teach Chinese literacy for immigrant women?

The objective of my lessons was to assimilate immigrant women *(MP fits into Episode: Gwen holds the pedagogy of assimilation toward immigrant women)*. Immigrant women should share social responsibility in Taiwan *(Prop fits into Episode: Gwen's taken for granted assumption toward immigrant women)*. I was convinced that immigrant women did not have the ability to raise their children unless they were literate in the Chinese language *(MP fits into Episode: Immigrant women have to learn Chinese literacy to raise their children)*. Nonetheless, the native cultures of immigrant women were not considered important in teaching them Chinese literacy *(Prop integrates with Episode: Gwen's conception of useless native cultures of immigrant women reappears)*. My goal was to ensure that immigrant women students understand the Chinese cultures *(Prop and Episode: Understanding Chinese culture as prerequisite to learn Chinese literacy follows her pedagogy of assimilation)*. I opposed using the native cultures of

immigrant women to teach them Chinese because I presumed that, if my students relied too heavily upon their home cultures they would not learn Chinese language well *(Prop and Episode: Gwen's notion of uselessness regarding native cultures of immigrant women reappears)*. I believed that genuinely familiarizing immigrant women with Chinese phonetics was the key to increase their Chinese language proficiency *(MP: Chinese phonetics is crucial for immigrant women in Taiwan).* I asked my students to learn Chinese phonetics, the marked symbols of Chinese vowels and consonants, and other details *(Episode: Immigrant women in Gwen's program have been trying to familiarize Chinese phonetics).* I felt that by exhaustively learning the Mandarin phonetic system, immigrant women would feel secure that Chinese phonology was finite and learnable *(TP within an Episode: feeling secure with Chinese phonetics is a turning point for immigrant women in terms of learning Chinese language).* I encouraged immigrant women to engage in a broad range of Chinese reading (i.e., newspapers, magazines, and so on), as long as the literature was accompanied with Chinese phonetic symbols *(Episode: Immigrant women in Gwen's program have been urged to read Chinese literature extensively).* I asked my students from the same countries to help each other by translating some new Chinese characters into their native languages and clarifying the meanings of these words *(Episode: immigrant women in Gwen's program have been helping each other to understand some new Chinese words).*

Hannah

Question: Tell me about your background information?

Although I was in my early thirties and had been teaching only five years, I had become a senior fifth-grade teacher *(Episode: Hannah has become an experienced fifth-grade teacher)*. I was a bit nervous that I was observing me in the very first class I was teaching for immigrant women in the evening literacy program *(Event: I observed Hannah's evening literacy program for couple hours).*

Question: Why is there a foreign bride phenomenon in Taiwan?

I believed that the primary reason immigrant women came to Taiwan was to give birth to children, regardless of their other contributions to local economy in Taiwan *(TP: Moving to a foreign country and give birth to children are big turning points for immigrant women in Taiwan).*

Question: Tell me how you teach Chinese literacy for immigrant women?

I believed that immigrant women can be transcended beyond their restrictions of the daily life routine by gaining a rational reality through academic reading *(Hannah's MP as well as immigrant women's: Gaining academic knowledge and being able to see rational reality are crucial for immigrant women in Taiwan).* In my classroom drills, I encouraged immigrant women to practice creating Chinese sentences based on new Chinese characters that were introduced to them *(Episodes: Hannah has been engaging her immigrant woman students to practice creating Chinese sentences).* Nevertheless, I was not satisfied with my students *(Prop: Hannah's reappearing assumption about immigrant women who fail to gain academic knowledge and rational reality).* Sentences created by my immigrant women students almost always related to their fathers-in-law, mothers-in-law, husbands, children, or their household *(Prop: Hannah's reappearing assumption about immigrant women who fail to gain academic knowledge and rational reality).* It seems to me that immigrant women are not as knowledgeable as fifth graders. I encouraged my immigrant women students to read books extensively, so that they would gain knowledge *(Prop: Hannah's reappearing assumption about immigrant women who fail to gain academic knowledge and rational reality & Episodes: Hannah has been urging immigrant women in her program to engage in reading Chinese books).* I also tried to teach the children of some immigrant women in my evening literacy program *(Episode: Hannah has been trying to teach kids brought to her evening literacy program by their immigrant mothers).* Monica, one six-year-old, was a child who rejected learning, because she wanted to play with the other children instead of learning Chinese phonetics in her mother's evening

literacy program *(Prop: Hannah's taken for granted assumption about failing to learn Chinese phonetics academically means to fail in life for kids).* I utilized immigrant women's home and community-based knowledge of Kaohsiung City to explain abstract conceptions during class time *(Episode: Hannah has been trying to incorporate community knowledge into her teaching approaches).*

Question: Do you have any difficulties in teaching Chinese literacy for immigrant women?

I realized that my immigrant students could not pronounce some common Chinese vowels, such as [an] and [ang] *(TP: Hannah's realization about the limitation of immigrant women's Chinese pronunciation, instead of trying to standardize immigrant women's pronunciation).*

Yvonne

Question: Tell me about your background information?

I had taught six semesters of evening adult literacy program *(Episodes: Yvonne has been teaching evening literacy program for immigrant women for a long while).* Despite the fact that I was in my early thirties, I was considered a senior literacy teacher for immigrant women *(Episodes: Yvonne has been teaching evening literacy program for immigrant women for a long while).*

Question: Tell me how you teach Chinese literacy for immigrant women?

I often scheduled a potluck supper in my literacy program, so that immigrant women could bring foods from their native cuisines to share *(Many events).* My goal for immigrant women students was to challenge the patriarchal structure in their Taiwanese families *(MP: Yvonne's pedagogy of critical thinking. Yvonne is a criticalist).* I attempted to convince my students that in today's world men and women were considered equal in Taiwan, but I was not successful *(Episode: Yvonne has been trying to develop immigrant women's critical consciousness in questioning men's status).* Nevertheless, the Vietnamese women students would not question their unequal status in their households, because their cultures were being manipulative by ideologies *(Prop: a reappearing assumption that immigrant women are manipulated by some ideologies).* I was trying to arouse immigrant women in my literacy program to challenge the authoritative roles of men in their households *(Episode: Yvonne has been trying to develop immigrant women's critical consciousness in questioning men's status)*, but I knew that these women would meet potential resistance rooted in their patriarchal Vietnamese family structure *(An Episode related to a Prop: a reappearing assumption that immigrant women are manipulated by some ideologies).* The concept of equality between men and women promoted by me did not seem to fit into traditional notions of respectable men versus less honourable women held by conservative families in Taiwan, Vietnam, and other Southern Asian countries *(An Episode fits into a Prop: a reappearing assumption that immigrant women are manipulated by some ideologies).* If I responded culturally to my Vietnamese students by letting them follow their family power structure, I would fail in challenging my students with the ideology of inequality between men and women *(Prop: the ideology of inequality between men and women as a taken for granted reappeared assumption).* I doubt if I can ever shake the long-standing cultural belief that a woman dedicates her life day and night for her family *(Prop: the ideology of inequality between men and women as a taken for granted reappeared assumption).* I sometimes loved my immigrant woman students in the evening literacy program more than my daytime elementary level students, because these women showed more kindness toward me as a teacher *(An Episode intertwines with a Prop: Yvonne has been loving toward her immigrant woman students, because they have good characteristics).* I did not agree with the agenda of colonizing immigrant women popularized by other literacy teachers *(Episode: Yvonne is against the pedagogy of assimilation toward immigrant women).* I intended to preserve the virtues of hospitality and diligence found in the Vietnamese, the gentleness found in the Thai *(An Episode fits into a prop: Yvonne has been trying to preserve good characteristics of*

immigrant women). I respected the qualities the Vietnamese and Thai people brought to Taiwan *(An Episode fits into a prop: Yvonne has been trying to respect good characteristics of immigrant women).*

Question: Do you have any difficulties in teaching Chinese literacy for immigrant women?

Immigrant women's tongue positions are different than those in Taiwanese. They cannot distinguish [ch] and [si] *(A Prop fits into an Episode: reappearing assumption about the limitation of immigrant women's Chinese pronunciation).*

Question: Do your immigrant woman students have any cultural conflicts in Taiwan?

I knew several Taiwanese men who married immigrant women *(Prop: reappearing phenomenon of immigrant women married to Taiwanese husband).* The husbands no longer permitted the immigrant wives to worship the ancestor shrines in their original families *(An Episode and a Prop: Husband's cultural insensitive and irresponsive attitude toward immigrant women).* The husbands would only allow the wives to pray to the Baal in the husbands' families *(An Episode and a Prop: Husband's cultural insensitive and irresponsive attitude toward immigrant women).* If Vietnamese and Pilipino wives in Taiwan continued to follow Taiwan's custom of patriarchal descent, they would be considered disloyal to their Taiwanese families if they sent money to their families in their home countries *(An Episode and a Prop: Husband's cultural insensitive and irresponsive attitude toward immigrant women).*
Below, I have transcribed and structurally coded tape-recorded interview texts from three literacy teachers from Taiwan about their teaching approaches.

Gwen
Question: Tell me about your background? What is your ethnicity? What language is your native language?

As a native Taiwanese, I grew up speaking the Taiwanese language (*OR: provides Gwen's ethnic and linguistic background).* I, now almost sixty years old, became involved in the evening adult literacy program about ten years before I retired from teaching the Chinese language for elementary level children *(OR: describes how Gwen was involved in evening literacy program for immigrant women).*

Question: Tell me how you teach Chinese literacy for immigrant women?

The objective of my lessons was to assimilate immigrant women *(CA: describes sequence of actions to assimilate immigrant women & AB: summarizes Gwen's main goal of assimilating immigrant women).* Immigrant women should share social responsibility in Taiwan *(EV: Gwen's commentary on her complicating action to assimilate immigrant women).* I was convinced that immigrant women did not have the ability to raise their children unless they were literate in the Chinese language *(EV: Gwen's commentary on her complicating action to assimilate immigrant women).* Nonetheless, the native cultures of immigrant women were not considered important in teaching them Chinese literacy *(EV: Gwen's commentary on culturally relevant or responsive pedagogy).* My goal was to ensure that immigrant women students understand the Chinese cultures *(AB: summarizes Gwen's main goal of assimilating immigrant women with Chinese cultures).* I opposed using the native cultures of immigrant women to teach them Chinese because I presumed that, if my students relied too heavily upon their home cultures they would not learn Chinese language well *(EV: Gwen's commentary on culturally relevant or responsive pedagogy).* I believed that genuinely familiarizing immigrant women with Chinese phonetics was the key to increase their Chinese language proficiency (*CA fits into EV: describes Gwen's sequences of actions in teaching Chinese phonetics for immigrant women and her commentary on the importance of familiarizing with Chinese phonetics).* I asked my students to learn Chinese phonetics, the marked symbols of Chinese vowels and consonants, and other details *(CA: describes the sequences of Gwen*

asking her immigrant woman students to learn Chinese phonetics). I felt that by exhaustively learning the Mandarin phonetic system, immigrant women would feel secure that Chinese phonology was finite and learnable *(RE: resolves the insecure feeling of learning Chinese language for immigrant women).* I encouraged immigrant women to engage in a broad range of Chinese reading (i.e., newspapers, magazines, and so on), as long as the literature was accompanied with Chinese phonetic symbols *(CA: describes sequences of actions where immigrant women are urged to engage in Chinese reading).* I asked my students from the same countries to help each other by translating some new Chinese characters into their native languages and clarifying the meanings of these words *(CA: describes sequence of actions where immigrant woman students help each other by code switching and translating unknown Chinese words).*

Hannah

Question: Tell me about your background information?

Although I was in my early thirties and had been teaching only five years, I had become a senior fifth-grade teacher *(OR: provides information of Hannah in her literacy program).* I was a bit nervous that you were observing me in the very first class I was teaching for immigrant women in the evening literacy program *(OR fits into EV: OR: provides situation and reaction of Hannah when I visited her class).*

Question: Why is there a foreign bride phenomenon in Taiwan?

I believed that the primary reason immigrant women came to Taiwan was to give birth to children, regardless of their other contributions to local economy in Taiwan *(EV: Hannah's commentary on the phenomenon of immigrant women in Taiwan).*

Question: Tell me how you teach Chinese literacy for immigrant women?

I believed that immigrant women can be transcended beyond their restrictions of the daily life routine by gaining a rational reality through academic reading *(AB: summarizes Hannah's teacher's belief).* In my classroom drills *(OR: provides situation of Hannah's class)*, I encouraged immigrant women to practice creating Chinese sentences based on new Chinese characters that were introduced to them *(CA: describes sequence of actions where Hannah engages her students in creating Chinese sentences).* Nevertheless, I was not satisfied with my students *(EV: Hannah's commentary on her students' performance in her literacy program).* Sentences created by my immigrant women students almost always related to their fathers-in-law, mothers-in-law, husbands, children, or their household *(EV: Hannah's commentary on her students' performance in her class).* It seems to me that immigrant women are not as knowledgeable as fifth graders *(EV: Hannah's commentary on her students' performance in her literacy program).* I encouraged my immigrant women students to read books extensively, so that they would gain knowledge *(CA: describes sequence of actions where Hannah engages her students in reading Chinese texts as many as possible).* I also tried to teach the children of some immigrant women in my evening literacy program *(AB fits into CA: summarizes and describes sequences of actions where Hannah tried to teach immigrant women's kids in her literacy program).* Monica, one six-year-old, was a child who rejected learning, because she wanted to play with the other children instead of learning Chinese phonetics in her mother's evening literacy program *(EV: Hannah's commentary on Monica's behaviour in her literacy program).*
I utilized immigrant women's home and community-based knowledge of Kaohsiung City to explain abstract conceptions during class time *(CA fits into RE: describes sequence of actions as to resolve students' problem of not understanding abstract conceptions in Chinese language).*

Question: Do you have any difficulties in teaching Chinese literacy for immigrant women?

I realized that my immigrant students could not pronounce some common Chinese vowels, such as [an] and [ang] (EV: Hannah's commentary on students' learning of Chinese phonetics).

Yvonne
Question: Tell me about your background information?

I had taught six semesters of evening adult literacy program *(OR: provides time and place).* Despite the fact that I was in my early thirties, I was considered a senior literacy teacher for immigrant women *(OR fits into EV: Yvonne's commentary on her teaching experiences and information about her age).*

Question: Tell me how you teach Chinese literacy for immigrant women?

I often scheduled a potluck supper in her literacy program, so that immigrant women could bring foods from their cuisines to share *(CA: cooking cuisines are complicated actions).* My goal for immigrant women students was to challenge the patriarchal structure in their Taiwanese families *(AB: summarizes Yvonne's goal of teaching).* I attempted to convince my students that in today's world men and women were considered equal in Taiwan *(CA fits into EV: describes sequence of actions where Yvonne tried to convince her students something and her commentary on the equality between men and women)*, but I was not successful *(EV: Yvonne's commentary on her complicated actions).* Nevertheless, the Vietnamese women students would not question their unequal status in their households, because their cultures were being manipulative by ideologies *(OR fits into EV: provides situation about Vietnamese cultures in terms of status of men and women and Yvonne's commentary on this cultural characteristics).* I was trying to arouse immigrant women in my literacy program to challenge the authoritative roles of men in their households *(CA: describes sequence of actions where Yvonne tried to develop immigrant women's critical thinking)*, but I knew that these women would meet potential resistance rooted in their patriarchal Vietnamese family structure *(EV: Yvonne's commentary on Vietnamese cultures regarding patriarchal structure in their society)*. The concept of equality between men and women promoted by me did not seem to fit into traditional notions of respectable men versus less honourable women held by conservative families in Taiwan, Vietnam, and other Southern Asian countries *(EV: Yvonne's commentary on her complicated actions)*. If I responded culturally to my Vietnamese students by letting them follow their family power structure, I would fail in challenging my students with the ideology of inequality between men and women *(EV: Yvonne's commentary on her complicated actions)*. I doubt if I can ever shake the long-standing cultural belief that a woman dedicates her life day and night for her family *(EV: Yvonne's commentary on her complicated actions)*. I sometimes loved my immigrant woman students in the evening literacy program more than my daytime elementary level students, because these women showed more kindness toward me as a teacher *(EV: Yvonne's commentary on her immigrant woman students' good characters)*. I did not agree with the agenda of colonizing immigrant women popularized by other literacy teachers *(EV fits into CA: Yvonne's commentary on the wide-spread pedagogy of assimilation toward immigrant women in literacy program in Taiwan and her sequence of actions to resist it)*. I intended to preserve the virtues of hospitality and diligence found in the Vietnamese, the gentleness found in the Thai *(CA: Yvonne's sequence of actions to honour immigrant women's good characteristics)*. I respected the qualities the Vietnamese and Thai people brought to Taiwan *(EV fits into CA: Yvonne's commentary on the respectful characters of immigrant women and also provides sequence of actions to honor immigrant women's good characteristics).*

Question: Do you have any difficulties in teaching Chinese literacy for immigrant women?

Immigrant women's tongue positions are different than those in Taiwanese *(EV: Yvonne's commentary on immigrant women's practices of Chinese phonetics)*. They cannot distinguish [ch] and [si] *(CA: describes sequence of actions where immigrant women tried to practice Chinese phonetics)*.

Question: Do your immigrant woman students have any cultural conflicts in Taiwan?

I knew that several Taiwanese men who married immigrant women *(OR: provides a situation or a phenomenon)*. The husbands no longer permitted the immigrant wives to worship the ancestor shrines in their original families *(AB fits into CA: summaries and describes sequence of actions of some Taiwanese husbands who marry immigrant women).* The husbands would only allow the wives to pray to the Baal in the husbands' families *(CA: describes sequence of actions of some Taiwanese husbands who marry immigrant women)*. If Vietnamese and Pilipino wives in Taiwan continued to follow Taiwan's custom of patriarchal descent, they would be considered disloyal to their Taiwanese families if they sent money to their families in their home countries *(EV: commentary made by some people in Taiwan on immigrant women's disloyalty toward their families in Taiwan).*

RESULT

The results of this study are based on two stages of data analysis and actual interview accounts from three teacher participants.

Gwen

As I identify common patterns of assumptions from thematically analyzing Gwen's interview narratives, Gwen enacts her pedagogy of assimilation to influence immigrant women's subjectivity. Gwen views herself as a social worker and wants immigrants to fit into the mainstream society of Taiwan. Gwen's teaching approach in literacy education for immigrant women is to sustain the structure of society by establishing a sense of identity for each individual member. With an agenda of homogenization, the role of literacy teachers is to ensure that these immigrant women understand, embrace and preserve beliefs, social norms and values at the expense of their own subjectivity. As a result, Gwen does not promote immigrant women developing subjectivity in a positive way. I identified a devaluing of immigrant women's native cultures and a valuing of Chinese cultures as a common predictable sequence in Gwen's teaching approach thematically. Gwen's conception of uselessness regarding immigrant women's native cultures in their Chinese language learning and usefulness of understanding Chinese cultures might potentially harm immigrant women's subjectivity.

Familiarity with Chinese phonetics can promote immigrant women in developing subjectivity in a positive way, because they can recapitulate romantic understanding as they pursue exhaustive details for security. Gwen believed that genuinely familiarizing immigrant women with Chinese phonetics was the way to increase Chinese language proficiency. Gwen asked her students to learn Chinese phonetics, the marked symbols of Chinese vowels and consonants. Being consistent with Egan (1997), Gwen felt that by exhaustively learning the Mandarin phonetic system, immigrant women would feel secure that Chinese phonology was finite and learnable. Gwen encouraged immigrant women to engage in broad range of Chinese reading (i.e., newspapers, magazines, and so on), so long as the literature is accompanied with Chinese phonetic symbols.

This is how Gwen's interview narratives fit together and the sequential order of things in her interview narratives.
2 OR—provided background information that would let us know Gwen's linguistic background and her teaching experiences
1 AB— provided a summary of Gwen's pedagogy of assimilation
5 CA— complicated actions are linked to Gwen's three teaching approaches of assimilating immigrant women, familiarizing them with Chinese phonology and Chinese culture, and letting them code-switching and translating some unknown Chinese words into their native languages. However, all five complicating actions are directly related to fulfil Gwen's goal of assimilating immigrant women with Chinese cultures.
5 EV—Gwen's self-evaluations regarding her teacher's beliefs reflect her complicated actions to assimilate immigrant women with the predominant Chinese cultures.

1 RE—Exhausting Chinese phonetics is to resolve immigrant women's insecure issue of learning the Chinese language.

Structure analysis on Gwen's interview texts shows that assimilation is how she enacts and deals with different components of immigrant women's subjectivity. Overly focusing on Chinese cultures may not be good in developing immigrant women's subjectivity. AB, CA, and EV are intimately connected in the structure of Gwen's interview narratives. Gwen's interview narratives do not have much orienting information. Her interview narratives begin with her core pedagogy of assimilation, followed by her various complicated actions to fulfil her goal of assimilating immigrant women in her program. Her self-evaluations are along the same line with her thought to assimilate immigrant women, with focus on utilizing Chinese cultures to achieve her goal and view native cultures of immigrant women as non-important.

Hannah

As I identify common patterns of assumptions from thematically analyzing Hannah's interview narratives, Hannah's pedagogy of rational reality seeking is to influence students in becoming academic knowledge seekers. Hannah's literacy education is to enable immigrant women to master a body of academic knowledge to see the rational truth through vigorous academic disciplines. As a result, the success of an immigrant woman student is measured by how much privileged academic knowledge she attains. Hannah's conception that no academic knowledge means no gain in rational reality and her over emphasis on the grasp of academic knowledge through academic drilling, reading, and practices might potentially harm the formation of immigrant women's subjectivity. Presumably, Hannah's enactment would work for some immigrant women who are used to this line of thinking in fostering their subjectivity in a positive way. Nevertheless, Hannah may not facilitate some immigrant women in developing a healthier subjectivity if she over emphasizes academic knowledge seeking.

Hannah integrated mythic understanding with culturally relevant/responsive pedagogy as she utilized immigrant women's home and community-based knowledge of Kaohsiung City to explain abstract conceptions during class time.

This is how Hannah's interview narratives fit together and the sequential order of things in her interview narratives. 3 OR—provided the context that would orient us to see Hannah's profession as a teacher for fifth graders and her nervousness of being her first time to teach immigrant women with I 's classroom observation
2 AB—summarized Hannah's faith on seeing rational truth through gaining academic knowledge for adult immigrant women and their kids
3 CA—complicated actions are closely related to Hannah's teacher's beliefs concerning the importance of seeking academic knowledge
7 EV—Hannah's strong sense of evaluating her students' bad performance on creating Chinese sentences reflect her teacher's beliefs about gaining crucial academic knowledge via reading extensively
1 RE—Hannah's realization of her students' restrictions on pronouncing some Chinese sounds resolves her students' anxiety to perform perfect Chinese phonology.

Structure analysis on Hannah's interview texts indicates that Hannah's strong sense of evaluating her students' Chinese sentence practices as bad performance might negatively influence her students in forming their subjectivity. AB, CA, and EV are closely interconnected in Hannah's interview narratives. Complicated actions and a strong sense of evaluating students' practices of creating Chinese sentences are direct results from Hannah's faith on academic knowledge and how to gain that from engaging students in extensive reading. Background information helps us see Hannah growth as a senior fifth grade teacher and her anxiety in teaching immigrant women the first time.

Yvonne

As I identify common patterns of assumptions from thematically analyzing Yvonne's interview narratives, Yvonne's pedagogy of critical consciousness is to influence immigrant women in becoming critical thinkers. Yvonne tried to discover critical properties from immigrant women's consciousnesses, develop them, and use them to challenge the patriarchal structure in their Taiwan's families. Yvonne's enactment might work for some immigrant women in developing their critical subjectivity, whereas she might discourage other conservative Southern Asian immigrant women in forming their subjectivity in a critical way. Yvonne's failure to convince her students of the inequality between men and women in immigrant women's families in Taiwan can be explained by some immigrant women's subjectivity. Some aspects of immigrant women's native cultures keep them from developing critical consciousness and questioning the status of men in families as Yvonne encouraged them to do. There are two other common sequences identified from Yvonne's interview texts. Some husbands of Taiwan's immigrant women are not culturally sensitive and responsive. As a result, some immigrant women suffer from their husband's cultural insensitivity and irresponsibility. Cultural insensitivity is harmful for immigrant women developing a healthy subjectivity. Immigrant women's phonetic limitations in their Chinese language performances lead some literacy teachers to stop standardization of their Chinese pronunciation and that may help immigrant women form a healthier subjectivity.

Yvonne often scheduled a potluck supper in her literacy program, so that immigrant women could bring foods from their cuisines to share. This is how she integrates somatic understanding with cultural competence to help immigrant women develop subjectivity in a positive way. Tasting food from different cultures is the beginning of both grasping the somatic meaning of the world and confirming the cultural diversity aimed at developing cultural competence.

This is how Yvonne's interview narratives fit together and the sequential order of things in her interview narratives.

3 OR—provided the time and space to let us know Yvonne's situation in her teaching career.

1 AB—summarized Yvonne's teacher's beliefs as herself a critical thinker and her goal to develop her students' critical thinking to question the current power structure of men in Taiwan's families

6 CA—two common sequential complicated actions are deliberately designed by Yvonne to persuade her immigrant woman students to challenge the ideology of superior men in their families in Taiwan; two other complicated actions are Yvonne's attempt to preserve good characteristics brought to Taiwan by immigrant women and the cultural insensitivity and cultural irresponsiveness among some husbands of immigrant women in Taiwan.

11 EV—provided Yvonne's commentaries on some traditions, customs, and ideologies of Southern Asian cultures which profoundly influence immigrant women from these countries to be submissive to men.

Structure analysis on Yvonne's interview texts points out that affirmative attitude towards immigrant women's virtuous cultural characteristics, such as, kindness and tenderness, can help them develop healthier subjectivity. Background information (OR) briefly enables us to see Yvonne's credentials as a senior literacy teacher for immigrant women in Taiwan. Complicated actions are strongly connected to Yvonne's evaluative commentaries on some downsides of Southern Asian cultures regarding the ideology of superior men. In her complicated actions and evaluative assumptions about immigrant women's native cultures, she has been through a series of struggles against the ideologies of superior men. On the one hand, she has a strong sense to preserve good qualities of Southern Asian cultures through the structure of her interview narratives. On the other hand, she is frustrated that some Southern Asian cultures keep immigrant women from questioning the manipulative ideologies which sustain the power-structure of men in families.

Hannah and Yvonne

Hannah and Yvonne coincidentally enact philosophic understanding and ironic understanding in their programs. To standardize Chinese phonology was schemed by Hannah and Yvonne for immigrant women as a general principle and philosophic understanding. Their emerged ironic understanding can promote immigrant women in developing their subjectivity in a positive way. Diversity affirmation is one of the cores in culturally relevant/responsive pedagogy (Gay 2000). This premise includes embracing linguistic pluralism. Presumably, when Hannah and Yvonne fail to standardize Chinese pronunciation for immigrant women, their ironic knowing would emerge and affirm the variation of immigrant women's Chinese phonology. Hannah realized that her immigrant students could not pronounce some common Chinese vowels, such as [an] and [en]. "The tongue positions are different than those in Taiwanese. They cannot distinguish [ch] and [si]" believed Yvonne.

CONCLUSION

Subjectivity, a consciousness-based intentionality, has its perspective consequence. Intertwined with these multiple perspectives in the integrated model of Figure 1, subjectivities of immigrant women in Taiwan are constantly re-constructed, reformed, and revised in developing plural narrative forms of knowledge (Heikkinen 2002) and are influenced by teaching approaches of their literacy teachers. This study takes a broad socio-cultural view to explore interview narratives of three teacher participants in answering these two questions: (1) How do literacy teachers for immigrant women in Taiwan enact and deal with different components of subjectivity? (2) In what ways, do literacy teachers advance or hinder immigrant women developing their subjectivity?

Results of data analysis lead to conclude that Egan's multiple perspectives as cognitively operational tools have effectively instructed immigrant woman students in their subjectivity development. For instance, Gwen help her students pursue exhaustive details in familiarizing them with Chinese phonetics as a romantic way of knowing to gain security. Gwen and Hannah may not agree with Egan's task of developing adequate language abilities aimed at expressing a unique imaginative consciousness. Gwen and Hannah insisted on playing the two traditional roles of a necessary social worker and an academic knowledge seeker and disregarded the accessibilities of Egan's multiple approaches to education. However, to over emphasize the immigrant women's role in sharing social responsibility and valuing academic knowledge while overlooking some forms of knowledge gained from daily lived experiences may not help immigrant women develop a balanced subjectivity. In the case of Yvonne, she has failed to promote immigrant women developing subjectivity in a critical manner. As Yvonne tried to engage immigrant women in questioning the patriarchy power structure in their Taiwanese families, the immigrant women held back because their native cultures dictated that they were not to challenge the men in their households.

This paper has demonstrated teaching approaches regarding how literacy teachers for immigrant women in Taiwan enact and deal with different components of subjectivity. Nevertheless, this study is limited in identifying all the ways that literacy teachers advance or hinder immigrant women in developing their subjectivity. For future studies, I will include voices from student participants and examine whether or not Gwen's teaching approaches of assimilation help them in developing a healthy subjectivity without sacrificing their cultural identities.

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Computer Instructional Package for Drawing 2 Dimension Subject Using AutoCAD 2008 Program

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ABSTRACT

The purposes of this research were to construct the computer instruction package of two-dimensional drawing on AutoCAD 2008 Program and to evaluate its efficiency, learning achievement and learners' satisfaction towards the package. The research tools were: 1) the computer instruction package 2) an achievement test, and 3) questionnaire on the learners' satisfaction. The experiment group was consisted of 32 students from vocational certificate in Machine Shop Department, Phattalung Technical College. The results revealed that the efficiency of the package was 81.40 /91.56 corresponding to 80/80 set criteria. The effectiveness of learning achievement was showed significantly different at the level of .01. Mean of the learner's scores toward the package was identified significantly different at the level of .05. The learners' satisfaction toward the package was a high level. This could be concluded that the computer instruction package of two-dimensional drawing on AutoCAD 2008 Program had the efficiency and could be used for self study.

Keywords: Computer Instruction Package; CIP, Computer Assisted Instruction; CAI, Learning Achievement, AutoCAD

INTRODUCTION

Computer technology has been developed successively for the past ten years and showed an important role in business, industries, and education. Especially in the education area, computer technology has played the important role for assistant teaching known as Computer Assisted Instruction (CAI). CAI was the technology of education with included of multimedia interactive to help in teaching in order to improve effectiveness [1-3]. Besides, CAI is considered as tool to reduce the difference between learners and could be used to support for skill teaching as well. When considered teaching method of CAI, it was found that CAI was teaching method using multimedia as non-linear, which let the CAI, could be flexible for study

[4]. Then, the efficiency of CAI was brought to widely use and help instructor to develop skill of teaching especially in vocational education.

Drawing technology subject was one of several subjects taught in technical colleges and it presently needed computer helping to teach to follow industrial technology. Then, learning method was needed to adapt and follow new technology. However, this subject was needed to practice for having better skill because it was complicated in drawing of two and three dimensions. Then, students who need to have better skill in this subject would like to have better program for study to be achieved in career. As researcher's experience in teaching this subject, students learned this subject were confused on how to use command program and steps of drawing of two and three dimensions. This subject was mentioned as case because it was the most used in Thailand using AutoCAD 2008 program shown in Table 1[5]. Therefore, researchers were considered that the importance of using CAI could be applied for teaching in drawing technology subject with AutoCAD 2008 program. These would be expected that applied CAI (In this research used Computer Instruction Package; CIP [6]) for teaching could be reduced gap of learning between students and effectiveness of study would be developed in better score.

RESEARCH OBJECTIVES

The objectives of this research were:

1. to develop the CIP for two dimension drawing using AutoCAD 2008,
2. to find an efficiency of CIP for two dimension drawing using AutoCAD 2008,
3. to study an effectiveness of CIP for two dimension drawing using AutoCAD 2008,
4. to study learners' satisfaction of CIP for two dimension drawing using AutoCAD 2008, and
5. to compare the effectiveness of CIP between treatment, studied with CIP, and control groups.

Table 1: Percentage of Computer aided Design User[6]

Computer aided Design Program	**Amount Percentage of User**
AutoCAD	28%
CAD key	1%
Inventor	10%
Mechanical Desktop	9%
Solid Edge	6%
Solid Works	27%
Turbo CAD	1%
Another Software 2D	1%
Another Software 3D	11%

RESEARCH METHODOLOGY

Steps of methodology for this research were operated in two steps, which were developed the CIP for two dimension drawing using AutoCAD 2008, and tested for efficiency of CIP, learning achievement, learners' satisfaction, and compared the effectiveness of CIP between treatment, studied with CIP, and control groups.

The Development of Tools

The development of the CIP for two dimension drawing using AutoCAD 2008 was followed the steps of Interactive Multimedia Computer Instruction Package (IMMCIP) created by Priroj Teeranatanakul [7], Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi.

Testing

Population/Sample
Population used for this research was vocational students of Vocational Education Commission registered in drawing using AutoCAD subject.

Sample of sixty four students was purposively selected from Machine Shop Department, Phattalung Technical College whose were registered in drawing using AutoCAD subject code 2102-2102, which was divided into treatment and control groups**.**

Factors studied in this research
Independent variable
Independent variable for this research was the CIP for two dimension drawing using AutoCAD 2008

Dependent variables

The dependent variables of this research were:
1.the efficiency of CIP for two dimension drawing using AutoCAD 2008,
2.the effectiveness of CIP for two dimension drawing using AutoCAD 2008, and
3.learners' satisfaction of CIP for two dimension drawing using AutoCAD 2008.

Tools used in the research

Tools used in this research were composed of:
1. the CIP for two dimension drawing using AutoCAD 2008,
2. the effectiveness test for CIP
3. questionnaire for asking learners' satisfaction of CIP

Experiment and Procedure

Researchers were run the experiment and collected data as follows:

1. Treatment group: Applied the CIP developed to teach for sample in each lesson at the time. Test for each lesson was done and data collected after finished each lesson total of six lessons.
2. Control group: Sample in this group was studied from instructor and steps were as same as treatment group.

After that, scores in each group were taken to calculate and compare in terms of statistic to conclude the research.

RESEARCH RESULTS

This research was used tools of CIP for two dimension drawing using AutoCAD 2008, effectiveness test, and questionnaire. Results were composed of testing efficiency of CIP for two dimension drawing using AutoCAD 2008, testing effectiveness of CIP for two dimension drawing using AutoCAD 2008, and testing of learners' satisfaction of CIP for two dimension drawing using AutoCAD 2008.

1. Result of testing efficiency of CIP for two dimension drawing using AutoCAD 2008

After researchers applied the CIP for two dimension drawing using AutoCAD 2008 to treatment group, results of total pre-test scores for 32 students were 359 points, which is accounted for 28.35 percent. Then, results of efficiency of CIP were analysed to compare to hypothesis set at 80/80 as criterion as shown in Table 2 and Table 3.

Table 2: Results of efficiency of CIP for module's test

Module	Module test score of 32 students	Percentage of efficiency of CIP for module's test
1	278.3	87
2	258.0	80.6
3	255.0	79.7
4	262.0	81.9
5	274.5	85.78
6	235.0	73.4
Efficiency of CIP for module's test (E_1)		81.4

As shown in Table 2, the results of an average score for each module of 32 treatment group were indicated as following:

1st module has total scores of 278.3 points and efficiency of 87%,
2nd module has total scores of 258 points and efficiency of 80.60 %,
3rd module has total scores of 255 points and efficiency of 79.7 %,
4th module has total scores of 262 points and efficiency of 81.90 %,
5th module has total scores of 274.5 points and efficiency of 85.78 %, and
6th module has total scores of 235 points and efficiency of 73.4 %.

The grant average of 6 module tests was at 81.4 percent, which is higher than the criterion set at 80 percent.

Table 3: Results of efficiency for CIP post test

Items	Amount
Total students	32
Total score of post test	40
Total test score of all students for post test	1172
Efficiency of CIP for post test (E_2)	91.56

As shown in Table 3, results of 32 students in treatment group, which test on total of 40 point score, were shown scores on 1172 point and indicated that the efficiency of CIP for two dimension drawing using AutoCAD 2008 of post test was at 91.56, which is higher than criterion set at 80 percent.

2. Results of Effectiveness for CIP
Results of effectiveness analysed from treatment group compared between pretest and post test were shown in Table 4 and 5.

Table 4: Comparing result of treatment group between pretest and post test ($\sum X_i$)

Activity	Total score $\sum_{i=1}^{n} X_i$	Efficiency	Effectiveness (E_{post} - E_{pre})
Pretest (E_{pre})	359	28.05	63.52

Post test (E_{post})	1172	91.56	

As shown in Table 4, results of effectiveness for treatment group found that the difference between pretest and post test scores was 63.52 percent, which was indicated that CIP for two dimension drawing using AutoCAD 2008 would help students to learn and achieve in this subject better and could be used for self study.

Table 5: Result of t – test comparison treatment group between pretest and post test

Test score	N	$\overline{X}$	SE.	t - test	df	Sig.
Pretest	32	11.22	.45	60.37	31	0.00
Post test	32	36.63	.35			

As shown in Table 5, t-test result of effectiveness for treatment group found that the difference between pretest and post test scores was 63.52 percent, which was indicated that CIP for two dimension drawing using AutoCAD 2008 showed significantly different at the level of .01.

3. Comparing results of effectiveness between treatment and control group
The grant average between treatment and control group of post test was analysed and test for t-test. Results of comparison between those groups were showed in Table 6.

Table 6: Result of t – test comparison of post test between treatment and control groups

Group	N	$\overline{X}$	SE.	t - test	Sig.
Treatment	32	36.62	.34	8.24	0.012
Control	32	33.28	.32		

As shown in Table 6, t-test result of average post test scores between treatment ($\overline{X}$ = 36.62, SE = .34) and control ($\overline{X}$ = 33.28, SE = .34) groups was showed significantly different at the level of .05. This would be indicated that using CIP for two dimension drawing using AutoCAD 2008 in treatment would provide better score than control group.

Learners' satisfaction of CIP for two dimension drawing using AutoCAD 2008

Since researchers finished applying the CIP to treatment group, questionnaire was provided to respondents to let them rate the score, which scale from 1 to 5, to evaluate the usability of learning module as shown in Table 8.

Table 7: Results of average score for Learners' satisfaction of CIP for two dimension drawing using AutoCAD 2008

Items	Mean	Result
Program component	4.18	good
Letter	4.14	good
Picture, Animation, and Video	4.14	good
Noise of explanation	4.17	good
Content component	4.19	good
Reaction component	4.12	good
Overall mean	4.16	good

As shown in Table 7, all items have been evaluate for learners' satisfaction, and showed that overall mean for every item was 4.16, which was indicated in good level. This could be concluded that treatment group was satisfied the CIP for two dimension drawing using AutoCAD 2008.

CONCLUSION

The development of CIP for two dimension drawing using AutoCAD 2008 results were satisfied the hypotheses as follows:

1. the efficiency of CIP for two dimension drawing using AutoCAD 2008 developed was 81.4 /91.56, which was as criterion set at 80/80,
2. the effectiveness of CIP for two dimension drawing using AutoCAD 2008 was 63.52 percent, which was better than criterion set at 60 percent,
3. The average of post test score for the treatment group, who studied from CIP, was higher than the control group.
4. the learners' satisfaction of CIP for two dimension drawing using AutoCAD 2008 was in a good level.

As results, the development of learners' satisfaction of CIP for two dimension drawing using AutoCAD 2008 was showed that the efficiency, effectiveness, and learners' satisfaction were followed the hypotheses. Moreover, the CIP developed was having high efficiency at 81.4/91.56, which was follow the criterion set at 80/80. Reasons that the CIP having better efficiency because the CIP was developed using multimedia and content component were taught from easy to advanced steps. This would help student adapting themselves to understand the content, and multimedia used animation would be useful for study because students can stop, going back to see previous content and could be tried to practice by themselves for drawing two dimension using AutoCAD 2008 at once. Then, the CIP content developed was flexible, this was brought it to help learners to reduce gap of learning between them [1-3]. Because of regular study in classroom, students could not going back or having free time to study. However, the CIP could be flexible better than normal study. It was affected to efficiency of learner and follows the hypotheses and significantly different [4-5]. Students studied from CIP have high effectiveness because it was affected from CIP having Multimedia with audio and wonderful graphics as well as students have free time to study without pressure of time and so on [8]. Moreover, students learned from CIP could be practice at the same time of study and can going back when they did not understand content. This would affect to better skill practice of learner [8-9]. When considering learners' satisfaction of CIP, it was found that students can study without pressure from instructor. It was helped to create better environment for studying [10]. Since they studied without pressure, it was affected to learner responding of usability of CIP in good level comparing to normal teaching in classroom.

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Teaching Metallographic by Integration Computer Instruction Package and Metallographic Standard Specimens

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ABSTRACT

The purpose of this research is to design the integration computer instruction package in Practical Metallographic with Metallographic Standard Specimens by divided in 2 groups are included Ferrous metal group (Steels and Cast Iron) and Non-ferrous metal group (Aluminium Alloys and Copper Alloys). After that it was brought to test to find out the efficiency of the package and the learning's achievement of the learners who use the Integration Computer Instruction Package and Metallographic Standard Specimens. The equipments which are used in this research are Integration Computer Instruction Package and Metallographic Standard Specimens, Pre-test, Module Test and Post-test. The exemplary group in this experimentation is 30 year-2-students in bachelor's degree of the Department of Production technology Education, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi. The research's result found that the evaluation of the quality of the Integration Computer Instruction Package from specialists in contents and media is in good level. The efficiency of Integration Computer Instruction Package which is designed for is 84.76/88.19 that follows the standard measure (80/80) and shows that the learning's achievement of learners who passed the Integration Computer Instruction Package and Metallographic Standard Specimens is raised in meaning of .05 the learners who have good attitude to The Integration Computer Instruction Package and Metallographic Standard Specimens. And the result of the observation learners' behaviour shows that learners are excited and enthusiastic in using The Integration Computer Instruction Package and Metallographic Standard Specimens. So we can conclude that The Integration Computer Instruction Package and Metallographic Standard Specimens are able to use in teaching.

Keywords: Computer Instruction Package, CIP, Metallographic, Metallographic standard Specimens, Metallurgy

INTRODUCTION

Preparation of teaching to get the effectiveness, the educationists generally accept Instruction media is a tool that can help learners to get the higher learning's achievement. So we use technology in teaching (cassette tapes, slide shows, still pictures, motion pictures, etc.). When there is the high technology, so we almost use the computer in field of business and field of industry. That why the educationists give

interesting in computer as teaching media. The Computer Assisted Instruction is a tool or teaching media which is very popular because it is an efficient assisted instruction. [1] The advantage of the computer assisted instruction is be a teaching media which can present the contents to learners via monitor or keyboard by bringing content and arranging teaching's instruction systematically, can use whenever we want, colourful, attract learners, save time for teaching which can make an opportunity for encouraging learners in individual. Also it can help instructor's work and in case of lack of instructor. [2] Bringing computer assisted instruction is very important because we can adjust the effectiveness and exciting much more over. In the same time, it also can save time much more over because instructors don't need to repeat teaching. [3-5]. Practical Metallographic is an important subject to train metallurgist's skill. Teaching always has theory and practice, general problem during teaching is learners cannot understand the Metallographic Principle, process and especially learners cannot give the explanation of The Physical Metallographic Principle. As researcher and teacher who teach this subject in Department of Production Technology Education, King Mongkut's University of Technology Thonburi found that general problems are caused from lack of Metallographic Standard Specimens, review learning media and practical instruction and explanation of the microstructure of metal. From these above important problems, practical metallographic learners cannot make understand how to analyse Metallographic Principle that causes Learners cannot analyse The Physical Metallographic Principle. By recognizing in the important and the effectiveness of the computer assisted instruction, researcher decide to collect the computer assisted instruction and Metallographic standard Specimens to integrate to teach in Physical Metallographic for having knowledge in Metallographic Skill Training and also resolving the problems during learning Physical Metallographic.

RESEARCH OBJECTIVES

1. To design and construction The Integration Computer Instruction Package and Metallographic Standard Specimens.
2. To evaluate the effective of The Computer Instruction Package.
3. To evaluate the learner's achievement via The Integration Computer Instruction Package and Metallographic Standard Specimens.
4. To evaluate the learner's attitude on the Integration Computer Instruction Package and Metallographic Standard Specimens.

RESEARCH METHODOLOGY

The procedure is divided in 2 main parts are designs The Integration Computer Instruction Package;CIP and designs The Metallographic Standard Specimens, The followed:

Designing the Metallographic Standard Specimens

Designing the Metallographic Standard Specimens is started by Brainstorming for analyzing group of Standard Specimens. From the analysis, we can divide it in 2 groups are included ferrous metal group (Steels and Cast Iron) and non-ferrous metal group (Aluminium Alloys and Copper Alloys). Then create the Standard specimens in 2 types are As-receive and Heat treatment. In Heat Treatment we can divide it in 4 types depend on cooling rate is Water Quenched, Air cooling, Oil cooling and Furnace cooling. Next, create the Instruction which has process and contents are according to CAI. After that, bring them to check the specification with Metallographic specialists for correction and quality of Metallographic Standard Specimens and the instruction. The instruction consists of 2 parts, part I is specimens' preparation, griddling, polishing and etching; Part II is the illustration of every group of Metallographic Principle at magnitude of 50-1000X with the explanation of detailed structure (Fig. 1).

Figure 1: Metallographic Package (CIP + Metallographic Standard Specimens)

Designing Integration Computer Instruction Package
The procedure of this research was organized in IMMCIP concept in 5 steps [6] as Fig.2 and 3. This process was starting with analysis, the followed:

Analysis

1) Brainstorm Chart Drafting;
2) Concept Chart Drafting (Fig. 4);
3) Contents Network Analysis Chart Drafting;

Design

4) Strategic Presentation Plan with Behaviour Objectives and Course Flow Chart Drafting;
5) Module Presentation Chart Drafting;

Development (Course Forming)

6) Script Development (Interactive Subject Frames);
7) Story Development by Storyboard Technique;
8) Contents Correctness, Contents Validity and Reliability Check-Up;
9) Test Item Check-Up (Difficulties, Discrimination, Validity and Reliability);

Implementation

10) Authoring Software Selection (This research is meaning in order of Computer Based Programming and Database : Macromedia flash);
11) Acquisition of Readymade or Tailor-made Video, Animation, Audio, Picture and other Clip Art;
12) Completion of Creating IMMIP;

Evaluation

13) Quality evaluation (Multimedia and Instruction Design Check-Up);
14) Small Group Rehearsal Testing;
15) Efficiency Evaluation (E_1/E_2) Effectiveness Evaluation ($E_{post\text{-}test}/E_{pre\text{-}test}$);

Preparation of User's Manual for Publication

A Contents evaluation specialist or expert reviewed the test's content validity. The test item was analysed for the P-value (how easy/difficult), which was in the range of 0.20-0.80; the D-value was more than 0.20. The acceptable reliability value, which was based on Kuder-Richardson 20's formula, should not be lower than 0.60.

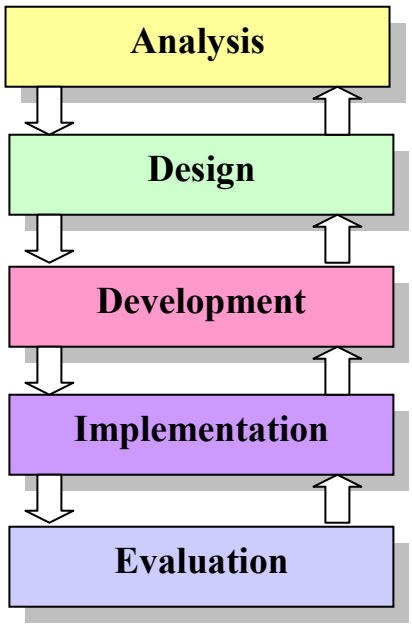

Figure 2: Structure of the Interactive Multimedia Computer Instruction Package (IMMCIP)

Data Collection

The research process will work with 30 learners in bachelor's degree by 3 times testing (Pre-Test, Module Test and Post-Test). Starting by Pre-test, next, let the learners study the content which is divided in 2 parts (Theory and Practice). Theory, learners will study the content via CIP which is mentioned to Practical Metallographic by Multimedia CIP, consisted by still pictures, motion pictures and Video clip. After finish each unit, learners will do Job Sheet, consisted by Metallographic Principle Check-Up Document with the Metallographic Standard Specimens. After finish Job Sheet, learners will do theoretical test and practical test. For theoretical test is optional answer and for practical test is using optical microscope which is Module test.

After finish every unit 1 week, learners will do Post-test, consisted of theoretical test and practical test. Then collect analysis result by computer's program.

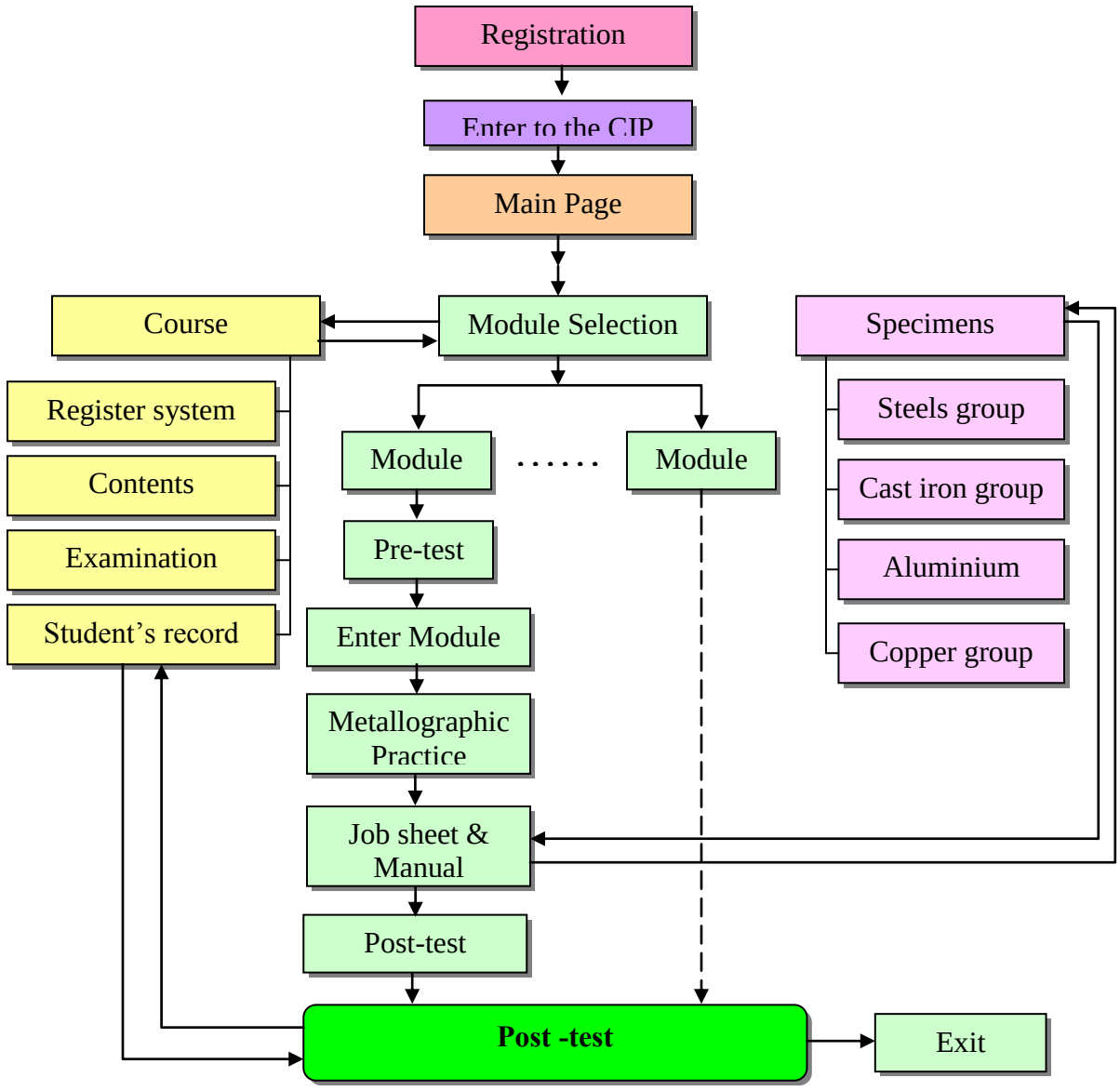

Figure 3: Schematic of the CIP with metallographic standard specimens

RESEARCH RESULTS

1. From Content and Multimedia specialist's evaluation shows that the Computer Assisted Instruction integration with Metallurgy Standard Specimens has good quality in meaning of .05(Table1-2);
2. From CAI Test result shows that CAI has efficiency at 84.76/88.19 (standard measure is 80/80);
3. Learners get higher learning's achievement in meaning of .05 (Table 1) which can show that the difference of pre-learning and post-learning average score is 62.19;
4. Learners have good attitude to Integration Computer Assisted Instruction with Metallurgy Standard Specimens in meaning of .05.

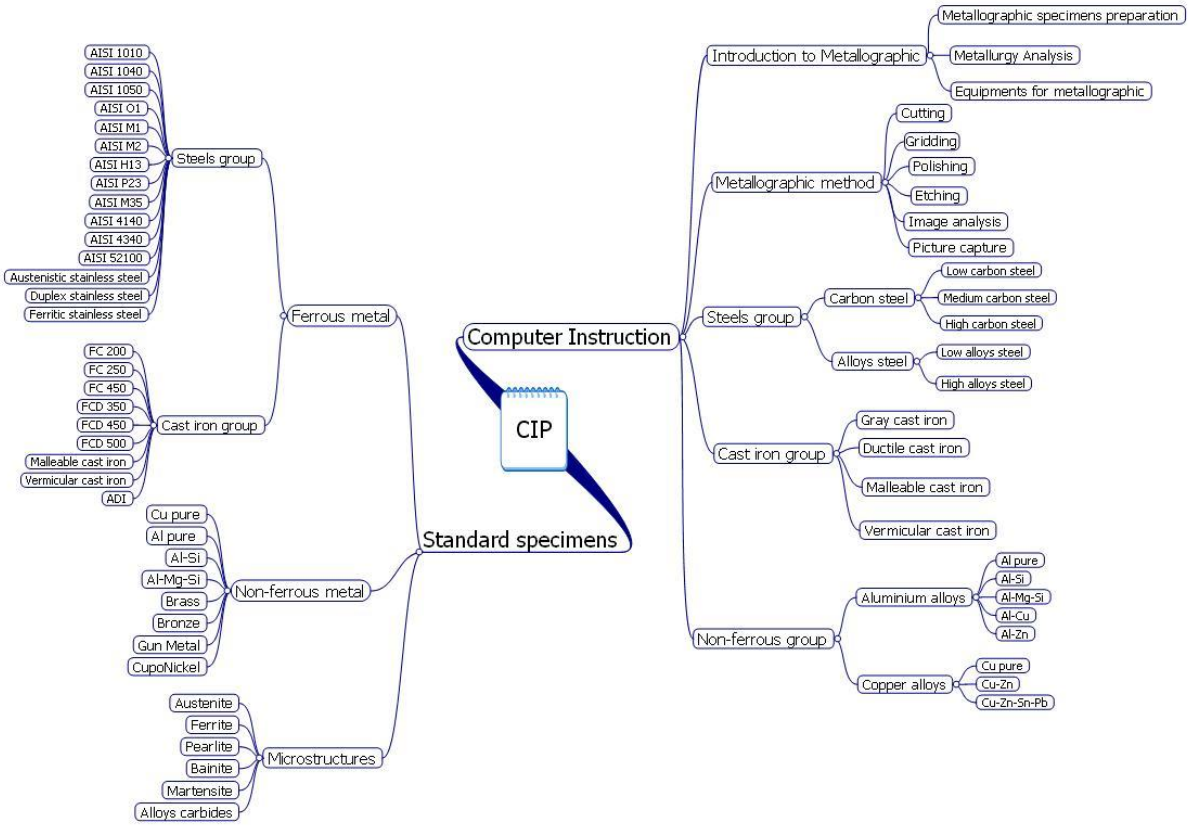

Figure 4: Concept chart for construction the CIP with metallographic standard specimens

CONCLUSION

From the CIP efficiency's consideration shows that the Computer Instruction Package which has the effectiveness according to the measure is from the collection of multimedia. Because the multimedia is a media which can motivate learners to make interesting in the content. Practical Metallographic is a subject that learners must understand the illustration. So that if learners can understand the Metallographic process means learners also can understand the Metallographic Check-Up process too. The CIP can serve to learners because of Animation and Video clip, provided to show the content to learners. So learners can make understand in each step systematically. And more than that can revise and review the content which they don't understand practically and unlimitedly. Besides, learners can practice by using Job Sheet which shows details clearly and also using Metallographic Standard Specimens to make accordance in theory and practice of content. From the above results shows that learners who use the Computer Instruction Package integration with Metallurgy Standard Specimens get higher learning's achievement by difference and in meaning of the score between Pre-Test and Post-Test (62.19%) which is a high level and can believe that learning via the Computer Instruction integration Package with Metallurgy Standard Specimens can make learners get higher achievement.

We believe that learning via the Computer Instruction Package integration with Metallurgy Standard Specimens can reduce the gap of Metallographic Principle Analysis Practical Skill can make learners get better result. Learning which can revise by self, can test by real specimens unlimitedly and use Practical Skill Instruction effect to learners who learn by using the Multimedia can get motivation from the CIP and Metallurgy Standard Specimens can learn better. Because learning to develop skill always starts from following and imitating the pattern. When being familiar after that is being expert [7-8]. So integrating the CIP and Standard Specimens is a solution which can improve learning's efficiency [9-10]. However, CIP

Media also can be a good option for individual studying because the research's result shows when learners use CIP, they can understand much more in Mathematic content and Science content (not lease than 50%) than Arts content (just only 15%)[10]. Practical Metallographic content is an applied science, also for CIP, which is why learners can get higher achievement. Besides, it shows that learners who have used Computer Instruction Package Integration with Metallurgy Standard Specimens, have good attitude to Computer Instruction Package Integration with Metallurgy Standard Specimens because learners can train analysis skill by self, be able to griddling, polishing, etching and Metallographic analysis for each group of metal via optical microscope by using the Instruction and Computer Instruction Package with Metallurgy Standard Specimens for revising through learning.

So, Computer Instruction Package Integration with Metallurgy Standard Specimens is a tool which can use well in engineering field's teaching. Because the application or integration of the original and model serve to develop learners' competency successfully in both of the achievement of learning and attitude.

Table 1: Result of T-Test of Content e experts evaluated results comparative with 3.5 level criteria (3.5-4.5: good attitude level)

	Test Value = 3.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
ContentExpert1	4.682	19	.000*	.75000	.4147	1.0853
ContentExpert2	3.082	19	.006*	.50000	.1605	.8395
ContentExpert3	2.979	19	.008*	.55000	.1636	.9364

*P-Value<.05

Table 2: Result of T-Test of Instruction media experts evaluated results comparative with 3.5 level criteria (3.5-4.5: good attitude level)

	Test Value = 3.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
MediaExpert1	7.025	19	.000*	.95000	.6669	1.2331
MediaExpert2	6.474	19	.000*	.85000	.5752	1.1248
MediaExpert3	7.368	19	.000*	1.00000	.7159	1.2841

*P-Value<.05

Table 3: Result of T-Test between Pre-Test and Post-Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 PreTest - PostTest	-2.17667E1	2.12835	.38858	-22.56141	-20.97193	-56.016	29	.000*

*P-Value < .05

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Managing Cooperation between Police and Soil Developers in the Case of Public-Oriented Soil Development

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ABSTRACT

Considering the shortage of rain, poverty, and criminal problems, the Thai Government has set up policies to help solve these problems through various government organizations. The Land Development Department and the Provincial Police Region 4 have responded to these policies by creating a co-operative pilot project at 4 pilot districts; Banfang, Nhong-Reua, Phu-Vieng, and Pra-Yeuan, which are in Khon Kaen; a province in the Northeastern region of Thailand. These districts have the above-mentioned problems and have begun using the governments' new policies to solve the problems.

The researcher utilized a descriptive method of research; the data was then interpreted, analysed, discussed, and presented by using the descriptive-analytical method. The objective is to build cooperative management between police and soil developers in regards to public-oriented soil development.

The results showed that the Top-Down policy of pilot program motivated police and soil developers to participate in training and teamwork. Each group member understood their own role in working together, using the SWOT analysis system to identify their situation and did brain storming in planning, organizing, leading and controlling functions in their district groups. They could cooperate effectively, improving their understanding and skills in team management, building a knowledge centre, and launching cooperative projects in their own areas. The police can protect and serve the people, offer peace and security with cooperation from the people, and the soil developers can work fruitfully on soil development with police support. They have good attitudes toward cooperation in regards to public-oriented soil development, with statistical significance of 0.05 level. The steps of cooperation process become a model of successful cooperation conceptual framework to maintain the efficiency process and effective results to reach cooperative objectives.

Keywords: Managing Cooperation, Police, Soil Developer

INTRODUCTION

The country development plan of Thai government has one distinctive characteristic: public-orientedness (The office of the Prime Minister of Thailand 2003). Integration studies were employed to help people attain a good quality of life. Their role has been shifted to giving support in terms of education, technology, and budgets. Cooperation between organizations has become one of the development strategies. This includes encouraging people to engage themselves in brainstorming, in teamworking, in creative thinking, and problem solving, such as problems with drought, poverty, and crimes. These had been conducted widely among people in the Northeastern region of Thailand. (Ministry of Interior 2005)

The Royal sufficiency economy philosophy is used to help their thinking and managing their life in balance of reason and relations in daily life living, doing their occupation, and giving neighborhood happiness (Khon Kaen Province 2006). The government officers were factors to increase public

cooperation. Especially in the case of reducing criminal solving problem cooperation, the persons who were key success factors of cooperation were police who had more working experience in community and people who had more experience in police activities (Chachrid Tinchan 2002). In part for reducing poverty problems, the agriculture team in community was effected factor to run the strong activities by the community's objectives (Pimonpan Manosan 2000).

Following the Thai government's policy and related concepts, Mr.Preeda Patanathabutr, Advisory President of Land Development Department who supported soil developer's projects and Pol.Maj.Gen.Taweeporn Namsatian, Deputy Commissioner of Provincial Police Region 4 who was an expert in community police, created the cooperative pilot project of training. This project has been named "Soil Development Training Project for Community Police and Soil Developers".

Community police are police officers, who implement policing strategy and philosophy based on the notion that community interaction and support can help control crime, with community members helping to identify suspects, detain vandals and bring problems to the attention of police (Royal Thai Police 2005a). Soil Developers are volunteer farmers who passed training program and become representative of Land Development Department. Their activities are to contribute knowledge of soil and soil improvement to farmers (Training Unit of Land Development Department 2003a). According to this project, they cannot work following their duties only. They are motivated to do first cooperation. Cooperation is the process of working or acting together, which can be accomplished by both intentional and non-intentional agents. In its simplest form it involves things working in harmony, side by side, while in its more complicated forms, it can involve something as complex as the inner workings of a human being and even the cooperative role of police and soil developers in the spirit of public-oriented soil development that supported the way of utility spending out of limited management resources in both organization. It is the alternative to working separately in group competition.

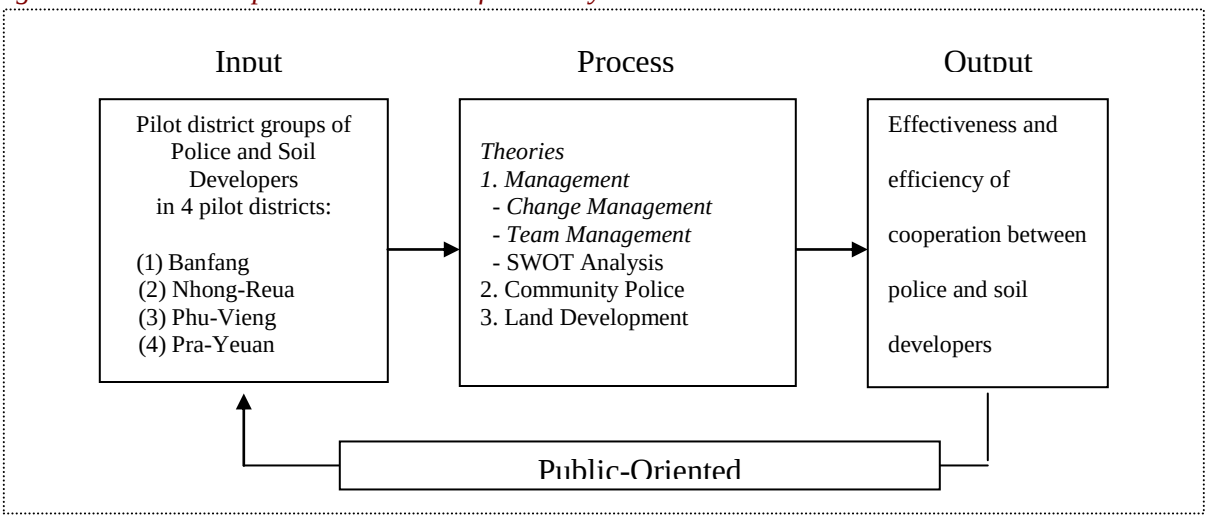
The pilot groups were community police and soil developers in 4 pilot districts: (1)Banfang, (2)Nhong-Reua, (3)Phu-Vieng, and (4)Pra-Yeuan, which are in Khon Kaen; province of the Northeastern region of Thailand. These districts have the above-mentioned problems and have begun using the governments' new policies to solve the problems.

This training project helped them to understand and become aware of both community police and soil developers' duties and responsibilities. First of all, both parties had to understand their roles, using the SWOT analysis to identify their position, and to create planning, organizing, leading and controlling functions in their district groups. They had to work together continuously for 4 months in order to create knowledge centre at each police station and expand organic fertilizer projects to their own areas. The evaluation was held at the end of each month by the representatives of Provincial Police Region 4, Land Development Department, Academics, and all group members.

This research on "MANAGING COOPERATION BETWEEN POLICE AND SOIL DEVELOPERS IN THE CASE OF PUBLIC-ORIENTED SOIL DEVELOPMENT" employed integrated studies of different fields: (1) **Management** focused on *change management* by fulfilling gap knowledge, giving participative opportunity and creating appropriate communication and *team management* by building team learning activities in planning, organizing, leading and controlling (Stoner, Jame A.F., Freeman, A. Edward and Gilbert, Daniel R., Jr., 1995), including *SWOT analysis* for brain storming out of results in team strengths, weaknesses, opportunities and threats Wheelen, Thomas L. and Hunger, J. David. 2002)., (2) Public Administration in part of **Community Police** focused on police and community relations reducing community criminal problem (Royal Thai Police 2005b), and (3) Agriculture in part of **Land Development** focused on the land developers' activities reducing land problems for agriculture related to community poverty problem (Training Unit of Land Development Department 2003b), and land development knowledge by using organic fertilizer (Land Development Department 2004).

The result of this study was the model of effective and efficient cooperation between police and soil developers. The conceptual framework of the study is as followed in figure1.

Figure 1: - The Conceptual Framework of the Study



RESEARCH OBJECTIVES

- To study the satisfaction level of police and soil developers in training and team work program for being readiness cooperative teams.
- To follow up and evaluate the level of team cooperative success in case of team management, knowledge center, and organic fertilizer projects.
- To find out the succeed cooperation conceptual framework for managing sufficiency cooperative team.

RESEARCH STUDY

The researcher utilized a descriptive method of research, and also the data was interpreted, analyzed, discussed, and presented by using the descriptive-analytical method (Triola, Mario F.,1995). The Collecting Data Areas were 4 pilot districts: (1) Banfang, (2)Nhong-Reua, (3)Phu-Vieng and (4)Pra-Yeuan. The research period was since August to December 2005 (Training in August and evaluating at the end of each month: September to December).

This research aims at studying Police and Soil Developers who passed the pilot project of training: "Soil Development Training Project for Community Police and Soil Developers" as shown in table 1, conducted in 4 pilot districts. The Independent Variables were Police and Soil Developers in pilot district groups and the Dependent Variables were the effectiveness and efficiency of cooperation between police and soil developers, are based on the following; (1)Satisfaction in Training, (2)Satisfaction in Teamwork, (3)Team Management, (4)Knowledge Center and (5)Organic Fertilizer Projects (including improvement methods).

The evaluators are divided into 4 groups: 6 representatives of Provincial Police Region 4, 3 representatives of Land Development Department, 3 representatives of Academics, and 78 members of pilot district groups, as shown in table 2.

Research instruments and techniques were participative-observation, interviewing, and questionnaires: by using Likert's Scale. The 5-scale is set up for the questionnaires of satisfaction in training and teamwork. The 4-scale is set up for the questionnaires of team management and organic fertilizer projects. The 3-

scale is set up for the questionnaires of knowledge centre. The researcher analysed and interpreted the scales as shown in table 3, 4 and 5. To ensure the content validity, the draft of the questionnaire was forwarded to the researcher's advisor for their comments and suggestions, and then forwarded to experts in different fields: Management, Public Administration, and Soil Development.

Statistical Treatment of the Data, The SPSS (Statistical Packages of the Social Sciences) program was used for analysis and interpretation of the scores, as shown in Table 6. The decision on whether to accept or reject the null hypothesis (H_0) at 0.05 levels of significance was based on the following criteria: H_0 was accepted if the computed-significant value is equal to or greater than 0.05., and H_0 was rejected if the computed value is less than 0.05.

There were 2 Hypotheses: **Hypothesis 1:** There was no significant difference in the attitudes of the Police and Soil Developers toward (1)Satisfaction in Training, (2)Satisfaction of Teamwork, (3)Team Management, (4)Knowledge Center and (5)Organic Fertilizer Projects. And **Hypothesis 2:** There was no significant difference in the attitudes of the 4 pilot district groups toward (1)Satisfaction in Training, (2)Satisfaction of Teamwork, (3)Team Management, (4)Knowledge Center and (5)Organic Fertilizer Projects.

SUMMARY OF FINDINGS

The General Data of Police and Soil Developers

- **Areas,** The police and soil developers who were in 4 pilot districts: Phu-Vieng had 24 members (30.2%), Nhonh-Reua had 20 members (25.6%), Banfang had 18 members (23.1%) and Pra-Yeuan had 16 members (20.5%), as shown in pie graph 1.
- **Position,** The police and soil developers included 78 respondents (100%): Police 44 respondents (56.4%) and Soil Developers 34 respondents (43.6%) with the ratio of Police : Soil Developers = 1.3 : 1 as shown in pie graph 2.
- **Gender,** 78 respondents were male (100%), as shown in pie graph 3.
- **Age,** There were 37 respondents (47.4%) in the age bracket of between 40-49 years old, 18 respondents (23.1%) were 50-59 years old, 15 respondents (19.2%) were 30-39 years old, and 8 respondents (10.3%) were 60 years old plus accordingly. There are no respondents less than 30 years old, as shown in pie graph 4.
- **Experience in the Job,** There were 25 respondents (32.1%) which had experience of between 5-10 years, 19 respondents (24.4%) had experience of 20 years plus, 13 respondents (16.7%) had experience of less than 5 years, 11 respondents (14.1%) had experience of 16-20 years, and 10 respondents (12.8%) had experience of 11-15 years accordingly, as shown in pie graph 5.
- **Experience in the Area,** There were 25 respondents (32.1%) which had experience of 5-10 years, 18 respondents (23.1%) had experience of 20 years plus, 13 respondents (16.7%) had experience of less than 5 years, 11 respondents (14.1%) had experience of 11-15 years and of between 16-20 years, as shown in pie graph 6.

From general data, the ratio of Police and Soil Developers is 1.3:1. They are from 4 pilot districts: Phu-Vieng > Nhong-Reua > Banfang > Pra-Yeuan accordingly. All respondents are male in range of age 40-49 years old. They had experience in the job and the area of approximately 5-10 years on average. Their attitudes are shown as follow:

The satisfaction level for being readiness cooperative teams

The satisfaction level of police and soil developers in training and team work program for being readiness cooperative teams were:

Satisfaction in Training.
The respondents were satisfied with the training and forecasted high success in cooperation. They had a high positive attitude towards cooperation in soil development. There was no significant difference in the attitudes of the Police and Soil Developers toward Cooperation Training, with a statistical significance of 0.05 level. There was no significant difference in the attitudes of the 4 pilot district groups toward Cooperation Training, with a statistical significance of 0.05 level.

Satisfaction of Teamwork.
Members had the same direction and goal in the team and shared the positive thinking. The team leader had a good leadership style. They set up meetings approximately twice a month. They always joined the team activities and shared ideas and made moderate contributions in the budget. Their respectable organizations gave valuable support. They also succeeded in cooperating with other related organizations. They received more knowledge and a better attitude whilst being group members. The differentiation of job moderately effected to team working. Individual members also experienced more effectiveness in their routine work and daily life. They had strong and positive attitudes toward teamwork. And this kind of cooperation should be expanded to other areas. There was no significant difference in the attitudes of the Police and Soil Developers toward Cooperation Teamwork, with a statistical significance of 0.05 level. There was no significant difference in the attitudes of the 4 pilot district groups toward Cooperation Teamwork, with a statistical significance of 0.05 level.

The level of team working success

The results of follow up and evaluate the level of team cooperative success in case of team management, knowledge centre, and organic fertilizer projects were:

Team Management.
Team management bore a highly effective result (with All Correct and Complete Level) and higher and higher effectiveness was achieved during each month that passed. There was no significant difference in the attitudes of the Police and Soil Developers toward Cooperation Team Management, with a statistical significance of 0.05 level. There was no significant difference in the attitudes of the 4 pilot district groups toward Cooperation Team Management, with a statistical significance of 0.05 level.

Knowledge Center.
The knowledge centre in each police station achieved a highly efficient result (With All Correct and Complete Level) and higher and higher efficiency was achieved during each month that passed. There was no significant difference in the attitudes of the Police and Soil Developers toward Cooperation Knowledge Center, with a statistical significance of 0.05 level. There was a significant difference in the attitudes of the 4 pilot district groups toward Cooperation Knowledge Center, with a statistical significance of 0.05 level. The differentiation group that had score less than other groups is Pra-Yeuan.

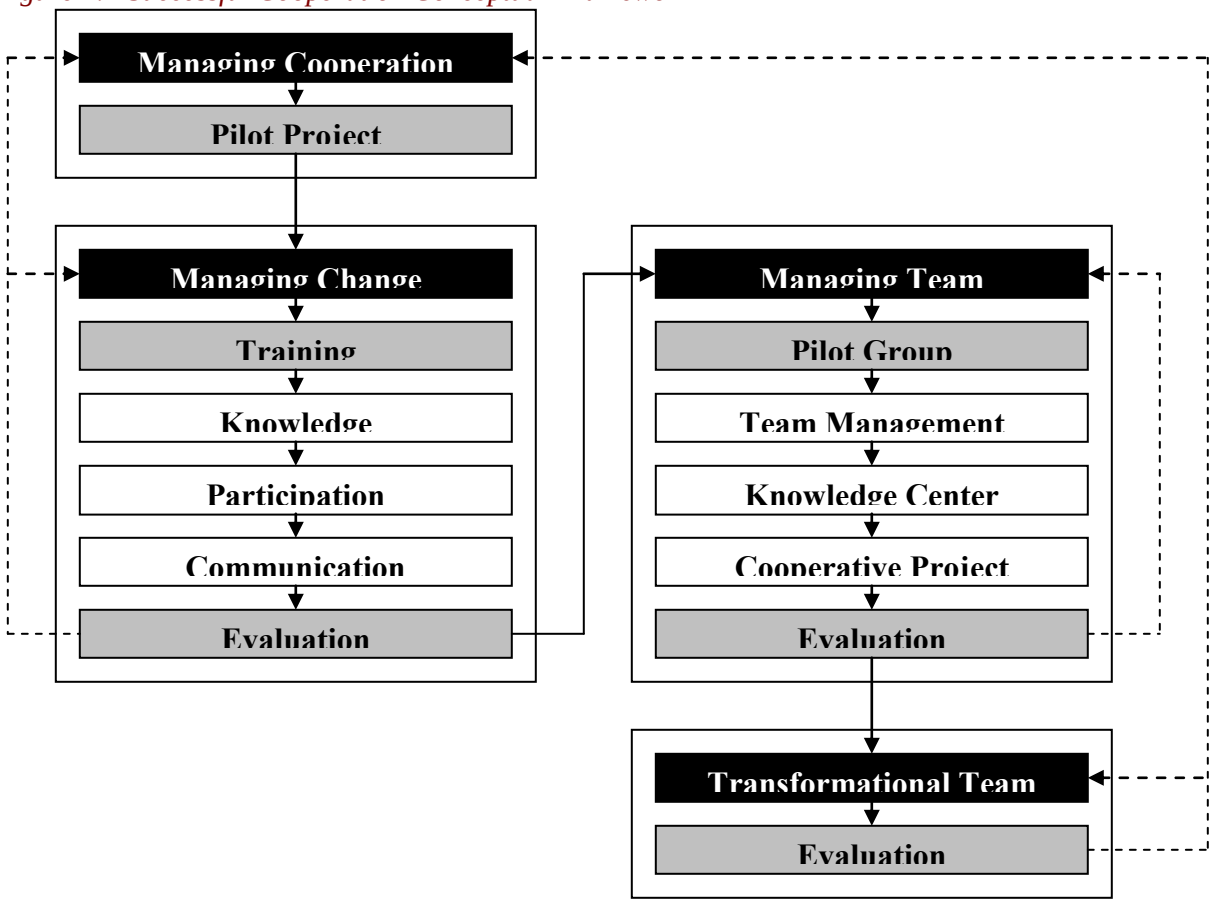
Organic Fertilizer Projects.
The Organic Fertilizer Projects bore fairly effective result (with Partially Correct and Complete Level) and higher and higher effectiveness was achieved, both in terms of quality and quantity, during each month that passed. There was no significant difference in the attitudes of the Police and Soil Developers toward cooperation organic fertilizer projects, with a statistical significance of 0.05 level. There was a significant difference in the attitudes of the 4 pilot district groups toward cooperation organic fertilizer projects, with a statistical significance of 0.05 level. The differentiation group that had a score of less than the other groups is Pra-Yeuan.

The average score and order of each pilot district groups are shown in table 7. Every pilot district group succeeded in Team Management, building a Knowledge Center, and expanding Organic Fertilizer Projects. They can be a model team for training people in their areas. Their strength was in the field cooperation and their weaknesses were in the fields of budgeting and understanding their bosses' directives.

The Successful Cooperation Conceptual Framework

This research found out the successful cooperation conceptual framework for managing sufficiency cooperative team as shown in figure2. The first step of managing cooperation is pilot project especially using for running creative idea to become an innovation activities. The second step is managing change by training method which fulfilling gap knowledge, giving participative opportunity and creating appropriate communication. The third step is managing team which is the pilot group by brain storming out of results in team strengths, weaknesses, opportunities and threats, building team learning activities in planning, organizing, leading and controlling and giving members' opportunity in learning and implementing their activities such as building knowledge centre and organic fertilizer projects. The transformational team is the factor that keeps all cooperation going ahead. The evaluation is important at the end of each step in cooperation activities. It helps to maintain the efficiency process and effective results to reach cooperative objectives.

Figure 2: Successful Cooperation Conceptual Framework



CONCLUSION

The pilot program was success factor for pushing and managing cooperation between police and soil developers. The police and soil developers were satisfied with the training and forecasted high success in cooperation. They had a high positive attitude towards cooperation in soil development and also members had the same direction and goal in the team and shared positive thinking. These readiness cooperative teams run their activities in team management bore a highly effective result, knowledge center achieved a highly efficient result, and organic fertilizer projects bore fairly effective result. This research were found out the successful cooperation conceptual framework for managing sufficiency cooperative team that will be fruitful for being a model of cooperation management.

The recommendations are: The local organization should continuously support the budget for ongoing development. The project should be continuously held once a year and should give the 4 pilot district groups the role of model teams for training others. Heads respective organizations should be invited to participate in the first training project. And The Provincial Police Region 4 and Land Development Department should continue this kind of cooperation project and expand it to other areas because this project has provided good benefits to local people and farmers.

ATTRIBUTES

Provincial Police Region 4, Royal Thai Police, Thailand:

- *Pol.Maj.Gen.Taweeporn Namsatian*
  Deputy Commissioner of Provincial Police Region 4
- *Pol.Lt.Col.Dr.Anusorn Patanathabutr*
  Deputy Superintendent of Provincial Police Region 4 Investigation Center

Land Development Department, Ministry of Agriculture, Thailand:

- *Mr.Preeda Patanathabutr*
  Advisory President of Land Development Department
- *Mr.Ath Somrang*
  General Director of Land Development Department
- *Mr.Praneat Wisetsri*
  Director of Region 5 Land Development Office
- *Mr.Saree Jungnijnirun*
  Director of Khon Kaen Land Development Office

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APPENDICES

Table 2 - The pilot project of training:
"Soil Development Training Project for Community Police and Soil Developers"
22-24 August 2005
At Irrigation Office No.6, Srijun Road, Muang, Khon Kaen

22 August 2005

Time	Schedule
08.00-09.00 a.m.	- Registration
09.00-10.00 a.m.	- Orientation
10.00-10.15 a.m.	- Morning coffee break
10.15-11.00 a.m.	- Training opened session
11.00-12.00 a.m.	- Project introduction - *Mr.Preeda Patanathabutr* Advisory President of Land Development Department - *Pol.Maj.Gen.Taweeporn Namsatian* Deputy Commissioner of Provincial Police Region 4
12.00 a.m.-01.00 p.m.	- Lunch
01.00-03.00 p.m.	- Iced breaking activity - *Mr.Sumnao Kongsai and colleague in academic level 8* Agricultural Faculty, Khon Kaen University
03.00-03.15 p.m.	- Afternoon coffee break
03.15-05.00 p.m.	- Soil and water preservations - *Khon Kaen Land Development Officer* - *Pol.Maj.Col.Weerawuth Seangsai*
05.00-06.00 p.m.	- Private time
06.00-07.00 p.m.	- Dinner
07.00-09.00 p.m.	- Police and soil developer cooperative project management and teamwork - *Pol.Lt.Col.Dr.Anusorn Patanathabutr* - *Asst.Prof.Dr.Ruchirat Patanathabutr*

23 August 2005

Time	Schedule
06.00-07.00 a.m.	- Morning Exercise
07.00-08.00 a.m.	- Private time
08.00-09.00 a.m.	- Breakfast
09.00-10.30 a.m.	- Cooperative activities of community police and soil developer - *Pol.Maj.Gen.Taweeporn Namsatian* Deputy Commissioner of Provincial Police Region 4
10.30-10.45 a.m.	- Morning coffee break
10.45-12.00 a.m.	- Cooperative activities of community police and soil developer - *Pol.Maj.Gen.Taweeporn Namsatian* Deputy Commissioner of Provincial Police Region 4
12.00 a.m.-01.00 p.m.	- Lunch
01.00-03.00 p.m.	- Soil development management, demonstration, and field trip at Buengnium, Muang, Khon Kaen *- Khon Kaen Land Development Officer*
03.00-03.15 p.m.	- Afternoon coffee break
03.15-05.00 p.m.	- Soil analysis *- Khon Kaen Land Development Officer*
05.00-06.00 p.m.	- Private time
06.00-07.00 p.m.	- Dinner
07.00-09.00 p.m.	- Police and soil developer cooperative project management and teamwork *- Pol.Ltj.Col.Anusorn Patanathabutr* *- Asst.Prof.Dr.Ruchirat Patanathabutr*

24 August 2005

Time	Schedule
06.00-07.00 a.m.	- Morning Exercise
07.00-08.00 a.m.	- Private time
08.00-09.00 a.m.	- Breakfast
09.00-10.30 a.m.	- How to be a soil development spokesman - *Mrs.Pranee Srihaban* - *Khon Kaen Land Development Officer*
10.30-10.45 a.m.	- Morning coffee break
10.45-12.00 a.m.	- Presentation: Police and soil developer cooperative project management and teamwork *- Pol.Ltj.Col.Anusorn Patanathabutr* *- Asst.Prof.Dr.Ruchirat Patanathabutr*
12.00 a.m.-01.00 p.m.	- Lunch
01.00-02.30 p.m.	- Presentation: Police and soil developer cooperative project management and teamwork - Training conclusion *- Pol.Ltj.Col.Anusorn Patanathabutr* *- Asst.Prof.Dr.Ruchirat Patanathabutr*
02.30-02.45 p.m.	- Afternoon coffee break
02.45-03.30 p.m.	- Training graduated certificate session - Training closed session - *Pol.Maj.Gen.Taweeporn Namsatian* Deputy Commissioner of Provincial Police Region 4

	- *Mr.Saree Jungnijnirun* Director of Khon Kaen Land Development Office

Table 2: The Evaluators

No.	**Position**			**Number**
1	The representatives of the Provincial Police Region 4			**6**
2	The representatives of the Land Development Department			**3**
3	The representatives of Academics			**3**
4	Members in pilot district groups			
	District	Police	Soil Developers	
	4.1 Banfang	11	7	18
	4.2 Nhong-Reua	11	9	20
	4.3 Phu-Vieng	11	13	24
	4.4 Pra-Yeuan	11	5	16
Total of pilot district members		44	34	**78**
			Total of evaluators	**90**

Table 3: Likert's 5-Scale

Questionnaire Scale	**Range of Mean Values**	**Descriptive Interpretation**
5	4.50-5.00	Strongly Positive
4	3.50-4.49	Positive
3	2.50-3.49	Neutral
2	1.50-2.49	Negative
1	1.00-1.49	Strongly Negative

Table 4: Likert's 4-Scale

Questionnaire Scale	**Range of Mean Values**	**Descriptive Interpretation**
4	3.50-4.00	All Correct and complete
3	2.50-3.49	Majority Correct and Complete
2	1.50-2.49	Majority Incorrect and Incomplete
1	1.00-1.49	All Incorrect and Incomplete

Table 5: Likert's 3-Scale

Questionnaire Scale	**Range of Mean Values**	**Descriptive Interpretation**
3	2.50-3.00	All Correct and Complete
2	1.50-2.49	Moderate Correct and Complete
1	1.00-1.49	Some Correct and Complete

Table 6: Statistical Treatment of the Data Followed the Statement of the Problems

No.	**Statement of the problems**	***Statistical Treatment of the Data***

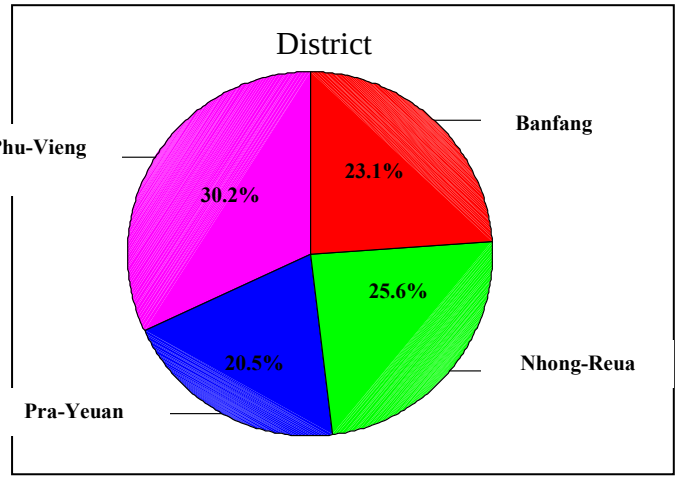
1	What was the profile of respondents in terms of areas, position, gender, age, experience in the job, and experience in the area?	Frequency Percentage
2	What was the attitude of the respondents towards (1)Satisfaction in Training, (2)Satisfaction of Teamwork, (3)Team Management, (4)Knowledge Center, and (5)Organic Fertilizer Projects	Weighted Arithmetic Mean Standard Deviation
3	To what extent did the attitudes of the Police and Soil Developers towards (1)Satisfaction in Training, (2)Satisfaction of Teamwork, (3)Team Management, (4)Knowledge Center, and (5)Organic Fertilizer Projects	Weighted Arithmetic Mean Standard Deviation T-Test
4	To what extent did the attitudes of the 4 pilot district groups towards (1)Satisfaction in Training, (2)Satisfaction of Teamwork, (3)Team Management, (4)Knowledge Center, and (5)Organic Fertilizer Projects	Weighted Arithmetic Mean Standard Deviation ANOVA Tukey Method

Table 7: - The average score and order of each pilot district groups

No.	**District**	Item 1			Item 2			Item 3		
		Team Management			**Knowledge Center Projects**			**Organic Fertilizer Projects**		
		Score	Order	Meaning	Score	Order	Meaning	Score	Order	Meaning
1	Banfang	3.9666	1	All Correct and Complete	2.7063	2	All Correct and Complete	3.5977	1	All Correct and Complete
2	Nhong-Reua	3.9024	3	All Correct and Complete	2.7056	3	All Correct and Complete	3.5434	3	All Correct and Complete

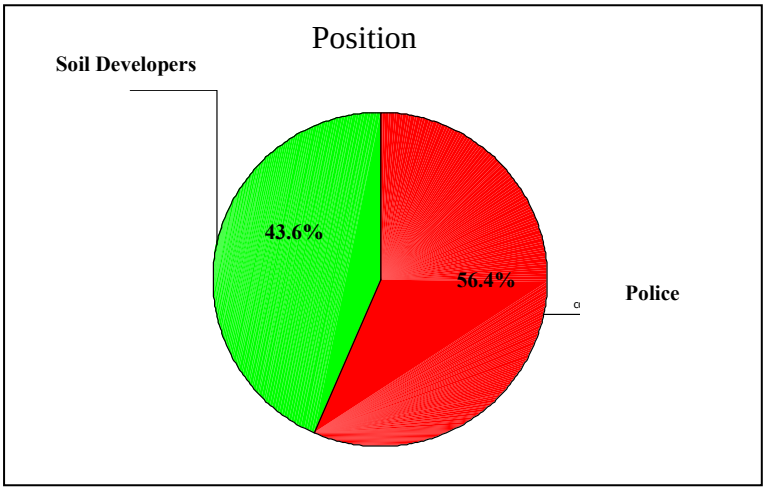
3	Phu-Vieng	3.9134	2	All Correct and Complete	2.7733	1	All Correct and Complete	3.5769	2	All Correct and Complete
4	Pra-Yeuan	3.8163	4	All Correct and Complete	2.5171	4	All Correct and Complete	3.1105	4	Majority Correct and Complete
Average in each item		3.9044			2.6857			3.4714		
Meaning in each item		All Correct and Complete			All Correct and Complete			Majority Correct and Complete		

Pie Graph 1: Pie graph of Percentage of Areas



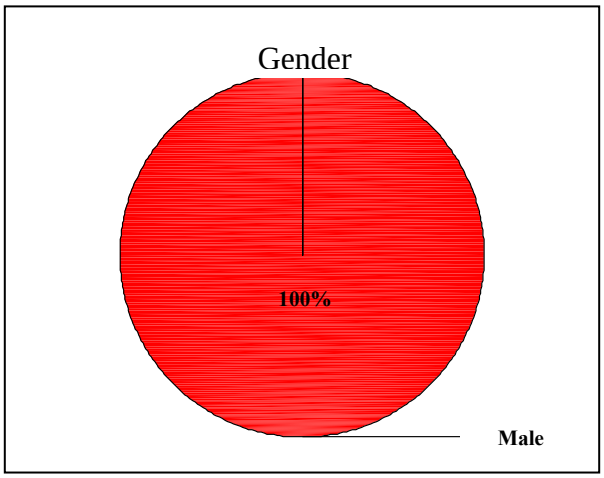
Phu-Vieng > Nhong-Reua > Banfang > Pra-

Pie Graph 2: Pie graph of Percentage of Position



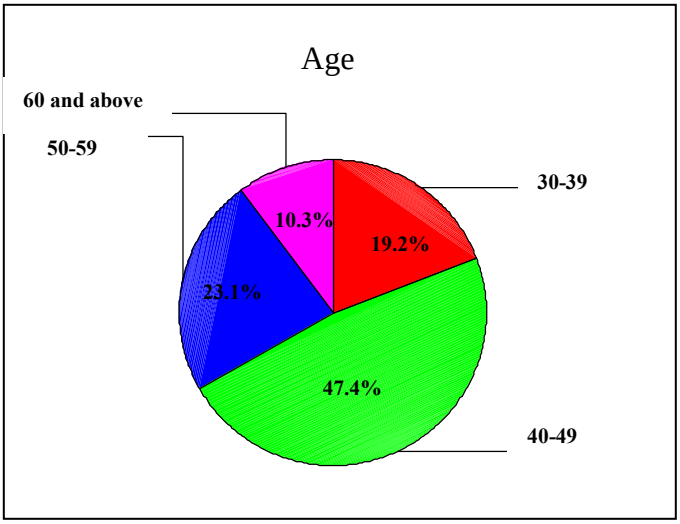
Police : Soil Developers = 1.3:1

Pie Graph 3: Pie graph of Percentage of Gender



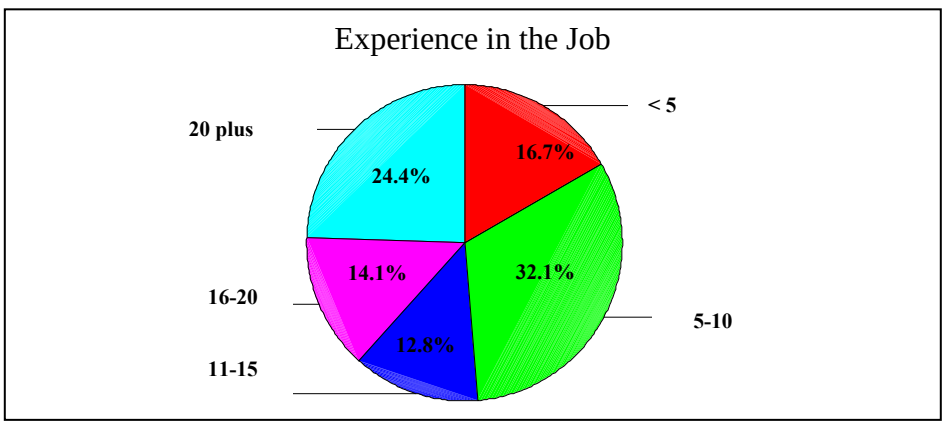
All Male

Pie Graph 4: Pie graph of Percentage of Age



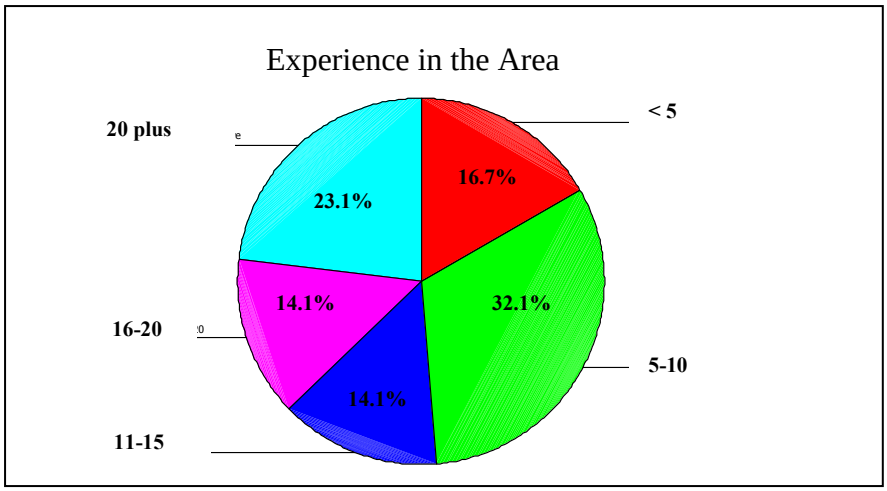
40-49 > 50-59 > 30-39 > 60 plus

Pie Graph 5: Pie graph of Percentage of Experience in the Job



5-10 > 20 plus > less than 5 > 16-20 > 11-15

Pie Graph 6: Pie graph of Percentage of Experience in the Area



5-10 > 20 plus > less than 5 > 16-20 and 11-15

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GLOPP: A Globalised E-Learning Study Package on "Globalisation and Livelihood Options for People Living in Poverty"

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ABSTRACT

Students in Zurich (a financial capital in Switzerland, one of the richest countries on Earth) and Kathmandu (capital of Nepal, one of the poorest nations on Earth) will soon be studying from this e-learning package called GLOPP.

Although designed to suit blended study, using Internet-provided materials and teacher-backup with seminars and tutorials, the GLOPP package has a CD to enable its main advantages to be used by those who have limited and only-occasional access to the Internet.

News of the coming advent of GLOPP came to Khon Kaen, too; but not by the Internet initially. A Zurich professor involved in developing GLOPP and on holiday in Thailand described it to an audience of mid-career students and pre-career students at KKU. The mid-career students were the 2007/8 class for MRDM (MA in Rural Development Management), and the pre-career students were associated with the Well-Being in Developing Nations programme and were finishing their postgraduate theses on Wellbeing in Developing Countries.

The leading author and presenter of this paper was one of the MRDM students, and is a Development Planning Officer with the Nepal Government in Kathmandu. He resolved to enquire further about GLOPP during an in-course research visit to Kathmandu in September 2008, before returning to Khon Kaen in October. However, that proved impossible as the University was closed for its annual vacation.
The paper describes GLOPP, which (funded by the Swiss Government) is an e-learning 'work in progress' with potential worldwide application. At the time of preparing the original version of this Abstract, the paper itself was a 'work in progress'; but, then, so is globalization and so are all our livelihoods.

Keywords: GLOPP, e-learning, geography, sociology, globalization, livelihoods, poverty, Zurich, Kathmandu, Khon Kaen, Nepal, Thailand.

INTRODUCTION

GLOPP is a package of learning materials and learning-support methods whose parts are accessible to anyone (who has been issued an appropriate password) at anytime from anywhere that has internet-connection.

It is trans-disciplinary, with target 'subject areas' of development studies, urban studies, geography and sociology.

It is trans-national, involving (initially) European and Third World universities in its development and usage.

It also transcends several 'communities of practice' in that its target-users are pre-career students (Bachelors and Masters), mid-career students (Masters) and professionals-at-work in its subject areas.

GLOPP's Aims and Methods

The project aims to provide students with experience of research processes and applications as well as analytical skills at an early stage of their studies.

Successful research demands excellent communication skills and the ability to collaborate with partners in the Third World. Giving students the opportunity to develop these skills in the context of an innovative course not only promotes the quality of student learning but also improves their chances on the labour market, both within academia and beyond.

GLOPP improves the quality of students' learning by:

- offering theoretical knowledge in combination with interactive exercises and real life examples from different regions of the world (provided by the wide network of the partners). The network consists of more than 180 partners, of which many are universities and study-related institutions. They can at the same time provide real life examples for GLOPP and use GLOPP within their own curricula.
- addressing other institutions regarding the distribution, when the first lessons are completed.
- using current research materials and adapting research methods for teaching.
- promoting collaborative work methods and networking.
- providing self-assessments with individualized feedbacks.

At any particular institution, the GLOPP modules can be embedded into any blended learning scenario. Thus students' acquisition of basic terminology and concepts can be transferred from classroom teaching to students exploration of online self-study materials. In the classroom there will be more time for discussing, analysing and generalizing authentic and current case studies from specific contexts of different developing countries.

The GLOPP course will provide three modules: namely 'Development and Globalisation', 'Livelihoods and Actor-orientation', and 'Inequality and Change'.

These three modules include eighteen multi-media lessons, with each lesson consisting of one or two learning units. Each lesson requires about 5 hours work time. The lessons offer material for undergraduate (Bachelor) and graduate (Masters) studies.

The first GLOPP lessons were tested in summer 2006 and implemented in autumn 2006.
GLOPP lessons are now integrated into different lectures and seminars at three Swiss universities: University of Zurich, University of Berne, and Ecole Poytechnique of Lausanne, with the lessons integrated into the learning management systems OLAT and Moodle.

GLOPP's Objectives

• to sensitise students to the living conditions of poor people
• to let students learn about the complexity of poverty
• to elaborate on and discuss theoretical approaches

• to introduce various research methods
• to provide opportunities to network

GLOPP's Target Groups

• Bachelor and Master students of geography, sociology, urban and development studies
• professionals in poverty related fields
• students of partner universities in the South and Asia

GLOPP's Methodology

• is blended learning with face to face inputs, feedback and discussions
• follows Gagné's "nine steps of instruction"
• complements theory and readings with exercises and self-tests
• introduces techniques of data collection and analysis in the social sciences

GLOPP's Lessons in Development and Globalisation

• What is the relationship between development research and practice?
• How do indicators frame development debates?
• How does globalisation affect people's lives?
• How is sustainability achieved in urban and rural contexts?

GLOPP's Lessons in Livelihoods and Actor Orientation

• What is a livelihood perspective?
• How do individuals perceive and act upon poverty?
• How do the surrounding conditions affect people's capabilities to achieve well-being?
• How are institutional settings and individual actions related?

GLoPP's :Lessons in Inequality and Change

• How can we measure inequalities?
• How do poverty situations change?
• What are the gendered aspects of poverty?
• Why do poor people migrate?
• What impact does violence have on people's livelihoods?

IMPLEMENTATION OF GLOPP IN NEPAL

As stated in the Abstract, it had been hoped that it would be possible to get information on how the University of Kathmandu and GLOPP intend to interact, and to explain that during the oral presentation of this paper to the Conference in November. Although that wasn't possible this year, Mr Subedi will follow it up next year, whilst working in Kathmandu.

FINDINGS, DISCUSSION and CONCLUSIONS

GLOPP clearly has the power to present relevant study material in an interesting and informative manner to the European students. It will reveal to the students in the partner institutions elsewhere in the world what aspects of living in poverty are initially seen to be germane by the participating European academics.

It may well be that these may differ somewhat from the 'local' outlooks. So GLOPP appears to be a beneficial expenditure of some of the Swiss taxpayers' monies.

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http://en.wikipedia.org/wiki/Nepal accessed on 18 September 2008.

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The Role of Education for Cultural Transmission in Suphan Buri Province

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ABSTRACT

The aim of this research is to study the culture form the past to the present, the personality and process of cultural transmission in Suphan Buri Province. The qualitative methods, literature study, oral history study and field study were used. The answer discovered the culture of Suphan Buri Province occurred before the historical period and still spread until the present. The past cultures are politics, socials, arts, language, and cultural heritage as way of life, dress, play, music and dancing, religious and folk wisdom. This resulted from the immigration of local people to Suphan Buri Province since Neolithic 3,800 year ago. The cultures come from the various local wisdoms. There are 3 process of transmission: family, in-formal education and schools. There is the mixing of culture in the curriculum and activities. Accordingly, this is resulted in the effectiveness of cultural transmission in Suphan Buri Province.

INTRODUCTION

BACKGROUND AND THE IMPORTANCE OF A PROBLEM

From the policy of the education and culture plan (A.D. 2002-2007) has considered the change of Thai social occurred by the development of globalization. Thai cultures must support and protect Thai people from dangerous objects. As culture is born together with the occurrence of people and country, which it's identify society, nationality; and imply the civilization of that society. Culture is the most important part of social long ago which generally refers to patterns of human activity and the symbol of society. (Thida Sarapar. 2002, 70)

Culture can be defined as the ways of life including arts, beliefs of people's group which passed down from generation to generation. Culture has been called "the way of life for an entire society." such as, manner, dress, language, religion, ritual, art, behaviour, law and morality, and belief. Culture occurred by social that intellect globalization. (Prapasri Sihaampai, 1990, 471)

Armmalar Pongsapit (2004, 34) show the relationship between human and culture by saying that. "Culture is an important part of people and has deeply related to society. Culture is the thing that separates the differential of social, meanwhile it can solve social problem too. When social change culture change and developed at the same time. Education is one of the processes in social satisfied so it also relate to culture in transmission, social life, and culture change".

Culture education is increasingly important for everyone as it teaches us the right behaviour, the good manners thus making us civilized. It teaches us how to lead our lives. Education is the basis of culture and civilization. It is helpful in the development of our values and virtues. Education cultivates us into mature

individuals, individuals capable of planning for our futures and taking the right decisions. Education aims us with an insight to look at our lives and learn from every experience. The future of a nation is safe in the hands of educated individuals. Education is important for the economic growth of a nation. It fosters principles of equality and socialism. Education forms a support system for talents to excel in life. It is the backbone of society.

Watcharee Karkoonngan (1999, 91) said that education has 3 important roles to develop culture.

1. Culture Preservation
2. Culture Expansion
3. Culture Creation

Manali Oak (2008) Education is the process of gaining information about the surrounding world while knowledge is something very different. Education is essential as it paves the path leading to disillusionment. It wipes out all the wrong beliefs in our minds. It helps create a clear picture of everything around us and we no more remain in confusion about the things we learn. Education brings up questions and also devises ways to find satisfactory answers to them. Education is about knowing that everything has a science to it, it is about learning to reason everything till every question meets its answer. Education can lead us to enlightenment. It is education that builds in every individual, a confidence to take decisions, to face life and to accept successes and failures. It instils a sense of pride about the knowledge one has and prepares him/her for life!

So the role of education for cultural transmission in Suphan Buri Province is very important issue for research as Suphan Buri has various cultures. It is an ancient city from the assumption of archaeological materials and things which were found that they were in the period of Neolithic age, Bronze age and Stone age. This city has extended its culture from Suwanapum Era, Funan, Amaravadi, Dhaveravadi and then Sriwichai to the present day.

Suphan Buri is located some 169 kilometers from Bangkok. Suphan Buri occupies an area of 5,358 square kilometers and is administratively divided into 10 Amphoes: Muang, Doembang Nangbuat, Bang Pla Ma, Si Prachan, Song Phi Nong, Sam Chuk, U -Thong, Don Chedi, Dan Chang and Nong Yasai.Suphan Buri Cultural transmission in Suphan Buri Province occur continuity and mixture, the transmission through family, in-formal education and schools. Various cultures are social, technology, and politics.

Its former name was "Dhavaravadi Sri Suwanapum" or "Pantumburi" located on the left side of the Tha Chin River. In the reign of King Katae, the city was moved to the right side of the river and the King assigned Mon Noi to build Wat Sanam Chai and reconstruct Wat Pa Leylai. The city was named "Muang Song Panburi" due to a number of 2,000 officers were pursued to enter the monkhood. Later, in the period of King U-Thong, he had settled the city on the west side of the river and named it "U-Thong". In the reign of Khun Luang Pa-Ngua, its name had been changed to "Suphan Buri" since then.

In Ayutthaya period, Suphan Buri became an important burden city because of its prosperity. This city was ruined and destroyed by the result of much wartime. In Rattanakosin Era, Suphan Buri was resettled on the east side of the river till the present day.

Suphan Buri became important in Thai history since the period of King Naresuan the Great when he defeated the Crown Prince of Burma in the battle on elephant's back at Donchedi. The province has held the annual fair to commemorate this event.

Well-known Thai literature "Khun Chang - Khun Phan" was originated in Suphan Buri. Places in this legend still can be seen nowadays, such as Ban Rua Yai, Wat Khao Yai, Tha Sib Bia, Wat Pa Leylai, amphue U-Thong, Amphue Sri Prachan, etc.

Nowadays, science and technology are rapidly changed so the educational institution has an important role in cultural education transmission. As culture is relation system between humanity and society. Today the growth of internet technology makes people receive other cultures easily and generally. New cultures make old cultures change all the time such as the way of life. So the roles education in culture transmission has 3 important parts: first is maintained, second is announced and third is created.

The different of Suphan Buri cultures, such as nation, belief, lifestyle, language, and behaviour. It chooses have to save and transmission characteristic of Suphan Buri people forever. Researcher uses the 3 systems of education to study: family, in-formal education and schools as a tool to study. How Suphan Buri cultures develop and transmission according to The National Education Act 1999? Moreover education is very important in culture development and transmission. Suitable cultures have to serve society, as culture might use to solve a problem and meet the requirement of the social.

RESEARCH QUESTIONS

General Questions

Since education is important tool in the development

1. How education develops and transmits cultural education?
2. What culture is the requirement of Suphan Buri people?
3. What culture those make Suphan Buri people proud?

Specific Questions

1. What is the characteristic of Suphan Buri culture?
2. What knowledge and folk wisdom Suphan Buri has?
3. How Suphan Buri cultures develop?
4. What is Suphan Buri culture change?

Research Objectives

1. To study the culture of Suphan Buri since the past until now
2. To analyses culture transmission in Suphan Buri
3. To present education role in cultural transmission and development in Suphan Buri

LIMITS OF THE RESEARCH

Content Limits

Study information about Suphan Buri culture, living, social change, environment, locale, geography, belief, tradition, folk wisdom and culture transmission in education system.

Area Limits

1. Mueang Suphan Buri Tumbol Wang Kom
2. Doem Bang Nang Buat Tumbol Bor Ku
3. Dan Chang Tumbol Wang You

4. Bang Pla Ma Tumbol Jaraka Yai
5. Si Prachan Tumbol Si Prachan
6. Don Chedi Tumbol Don Chedi
7. Song Phi Nong Tumbol Don Ma Now
8. Sam Chuk Tumbol Sam Chuk
9. U Thong Tumbol Ban Kong
10. Nong Ya Sai Tumbol Jan ngang

Research Definition

The role of education means learning process management that concern with Suphan Buri culture through education system.

Cultural transmission means knowledge transfer and Suphan Buri culture skill transfer from generation to generation through education system.

Suphan Buri culture means culture of social living, experience, knowledge, ability, belief, moral, legend, tradition, folk wisdom, and transmission from past until now.

Formal Education The education taught in schools, colleges, universities or institutions which have fixed and standard hours of instruction and curriculum. Such education is normally age-graded and offered in annual periods. The required qualifications for admittance to various levels are explicitly specified. Degrees and diplomas are normally awarded upon the completion of a certain number of years.

Informal Education Education or activities that are no arranged according to the formal schooling system. These activities can be conducted by educational institutions or other social institutions or associations to serve the needs and interests of learners. Informal education normally has a specific purpose and terminal curriculum. The duration may be short. Learners in the informal system frequently include individuals who have not had the opportunity to go to school, dropout learners, or persons who graduated from the school system but would still like to study specific subjects.

Family Education Education which refers to knowledge, skills, and attitudes derived from acculturation through daily experiences and exposure to the surrounding environment.

Research Methods

This research is qualitative research by study the culture of Suphan Buri and the education system in cultural transmission consist of 3 steps as fellow.

1. Literature and document

To study and make the understanding about the research problems and collect the information about the Suphan Buri culture since the past until now in 10 districts (Tumbol). 1. Mueang Suphan Buri 2. Doem Bang Nang Buat 3. Dan Chang 4. Bang Pla Ma 5. Si Prachan 6. Don Chedi 7. Song Phi Nong 8. Sam Chuk 9. U Thong 10. Nong Ya Sai and study about education system concern culture. The research document use to study is abstract, text book, annual report, academic document, article, journal and thesis which came from.

National Library
Suphan Buri National Library
Suphan Buri culture office
National museum

2. Oral history study

By interview elder, villagers, priest, locality leader and community leader to understand the culture about habitation, topography, belief, moral, legend, customs, traditions and folk wisdom.

3. Field study

To study the community background, development of history; customs, traditions, religion and folk wisdom by interview monk, teacher, and social leader emphasize community participation. Field study has the detail as follows.

History place
Educational institution or school
Study time take about 18 month to save the data in 10 districts (Tumbol).

Field data collects 5 way as follows.

1. Participant observation to keep information about behaviour, activity and tradition of the community such as SongKran (water festival) and New Year festival.
2. Non – participant observation by observe the area and the general environment of the community and keep the information about way of life, social, learning place such as Wat (Temple) and school.
3. In-depth interview by interview lecturer, monk, locality leader, villager's philosopher to find the information about education system and the transmission of culture in family, in-formal education and in schools.
4. Group interview to keep the information about the activity of community, problems, solution and the concept of leading culture to use in teaching in school.
5. Focus group discussion by collect the opinion about the culture experience and the attitude in culture transmission from community leader and grade 6-12 students.

The Advantage of the Research

1. Understand the cultures and get the information of Suphan Buri Province since the past until now.
2. Understand the role of education for cultural transmission in Suphan Buri Province.
3. Understand the trend of education curriculum development for Suphan Buri culture.

REVIEW OF LITERATURE

This research is qualitative research "The role of education for cultural transmission in Suphan Buri Province" from past to present. To analyses culture transmission in Suphan Buri and study the trend of education curriculum development for Suphan Buri culture. Researcher has studied and collects the information by study document, textbook, article and related research as fellow.

1. The meaning and characteristic of culture
2. The role of education in Culture Development
3. The importance of Suphan Buri culture

The Meaning and Characteristic of Culture

Definitions of culture: Forsberg, A. (2006 06 29)

Culture has been defined as a skill; "a luxury; an elite's prestige commodity; a simple aesthetic appreciation; (or) solely a folkloric epiphenomenon." The definition of culture I use in Geography 330

includes "every aspect of life: know-how, technical knowledge, customs of food and dress, religion, mentality, values, language, symbols, socio-political and economic behaviour, indigenous methods of taking decisions and exercising power, methods of production and economic relations, and so on." (Verhelst, T 1990 No *Life Without Roots* London: Zed Books p.17)

Culture permeates and influences every aspect of life, but it is not static however, rather it is a process in a constant state of flux and adaptation to new contexts, demands, and needs. Culture is not a deterministic force but rather a subtle and often subliminal pattern of thinking which describes the "organization of values, norms, and symbols which guide the choices made by actors and which limit the types of interaction which may occur between individuals" (-Parsons, Talcott & Shils, Edward 1990 "Values and social systems" ed. Alexander, Jeffrey & Seidman, Steven *Culture and Society, Contemporary Debates* Cambridge Univ Press, New York pp.39-40).

According to Spradley and McCurdy (1987) culture is "learned, and shared. In addition, culture is adaptive. Human beings cope with their natural and social environment by means of their traditional knowledge" (p.4). In other words, as something inherited, 'traditional' cultural knowledge developed within a particular spatial and temporal 'context' or 'environment'. But as a dynamic process culture continues to change as people cope with new challenges and adapt to changing conditions.

Underlying values and expectations are arbitrary conceptions "of what is desirable in human experience (and) these concepts of what is desirable combine cognitive and affective meanings they provide security and contribute to a sense of personal and social identity. For this reason, individuals in every society cling tenaciously to the values they have acquired and feel threatened when confronted with others who live according to different conceptions of what is desirable" Thus culture is like a "security blanket" which "has great meaning to its owner" (Spradley, P. & David W. McCurdy 1987 *Conformity and Conflict: Readings in Cultural Anthropology* Boston: Little Brown and Company pp.5-6).

"Culture is at once socially constituted (it is a product of present and past activity) and socially constitutive (it is part of the meaningful context in which activity takes place)" (Roseberry, W. 1989 *Anthropologies and Histories* Rutgers University Press, New Brunswick p.42).

Culture (from the Latin *cultura* stemming from *colere*, meaning "to cultivate") generally refers to patterns of human activity and the symbolic structures that give such activities significance and importance. (Harper, Douglas (2001)

Cultures can be "understood as systems of symbols and meanings that even their creators contest, that lack fixed boundaries, that are constantly in flux, and that interact and compete with one another. (Findley, Carther Vaughn and John Alexander Rothney (2006).

Culture can be defined as all the ways of life including arts, beliefs and institutions of a population that is passed down from generation to generation. Culture has been called "the way of life for an entire society." As such, it includes codes of manners, dress, language, religion, rituals, norms of behaviour such as law and morality, and systems of belief as well as the art. (Williams, Raymond)

Terpstran (1987) has defined culture as follows: "The integrated sum total of learned behavioral traits that are manifest and shared by members of society"

Culture is social tradition that expresses the way of life of humanity; by each social have special culture and different lifestyle. (Supatra Suparp 1997, 34)

Culture is the way of living of a social, behaviour's pattern and the expression of social member. Thai culture is the way of Thai's life that collects, choose and adjust to appropriate the social environment.

Culture can change according to the condition and time, when there is the invention or innovation or to solve problem and meet the requirement of society.

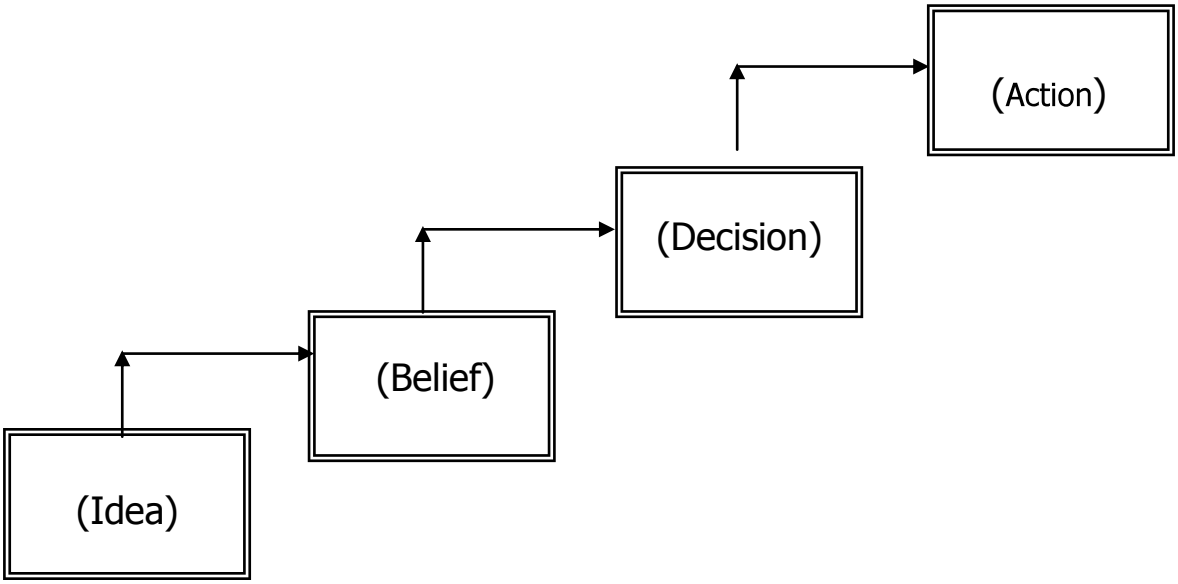
Culture in each society can be different in format; role or content but it must does not cause problem to social. Each society has to learn the different and nature of the culture of one and another.
Culture might divide in various kinds such as nation culture, local culture, and international culture depend on attitude and the objective of the community.

Culture is a tool to support the unity of community and development the way of life and need of the society.

The two group's anthropologists give the meaning of culture

1. Frank Robert Vivelo (1978) "Culture is concept system or knowledge system, belief, experience and decision making which set-up the behaviour of group".

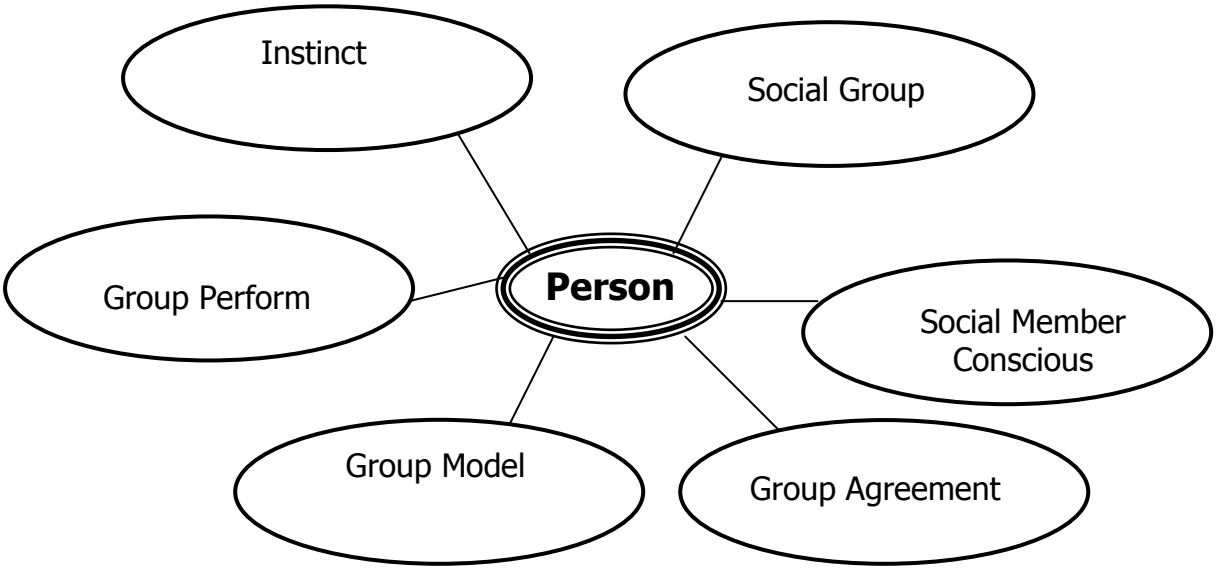
2.1 The culture chart of Mentalist View



2. The English anthropologist Sir Edward Burnett Tylor who wrote **Primitive Culture**, give the meaning of culture. "Culture, or civilization, taken in its broad, ethnographic sense, is that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society." Tylor asserted that the human mind and its capabilities are the same globally, irrespective of a particular society's stage in 3 social evolutions.

1. Savagery
2. Barbarism
3. Civilization

2.2 Culture Occurring Process Chart Totalist View



Culture is belief system, social values, way of life, and behaviour of people in the same society and culture transmission from generation to generation by regulation and acceptation of the social.

Culture is pattern of behaviour, belief system, social values, and way of life.

Characteristics of Culture by Dennis O'Neil

The first humans evolved in tropical and subtropical regions of Africa about 2.5 million years ago. Since then, we have successfully occupied all of the major geographic regions of the world, but our bodies have remained essentially those of warm climate animals. We cannot survive outside of the warmer regions of our planet without our cultural knowledge and technology. What made it possible for our ancestors to begin living in temperate and ultimately sub arctic regions of the northern hemisphere after half a million years ago was the invention of efficient hunting skills, fire use, and, ultimately, clothing, warm housing, agriculture, and commerce. Culture has been a highly successful adaptive mechanism for our species. It has given us a major selective advantage in the competition for survival with other life forms. Culture has allowed the global human population to grow from less than 10 million people shortly after the end of the last ice age to more than 6.5 billion people today, a mere 10,000 years later. Culture has made us the most dangerous and the most destructive large animal on our planet. It is ironic that despite the power that culture has given us, we are totally dependent on it for survival. We need our cultural skills to stay alive.

Over the last several hundred thousand years, we have developed new survival related cultural skills and technologies at a faster rate than natural selection could alter our bodies to adapt to the environmental challenges that confronted us. The fact that cultural evolution can occur faster than biological evolution has significantly modified the effect of natural selection on humans. One consequence of this has been that we have not developed thick fat layers and dense fur coats like polar bears in the cold regions because our culture provided the necessary warmth during winter times.

Culture is learned

Human infants come into the world with basic drives such as hunger and thirst, but they do not possess instinctive patterns of behaviour to satisfy them. Likewise, they are without any cultural knowledge. However, they are genetically predisposed to rapidly learn language and other cultural traits. New born humans are amazing learning machines. Any normal baby can be placed into any family on earth and grow up to learn their culture and accept it as his or her own. Since **culture is non-instinctive**, we are not genetically programmed to learn a particular one.

Every human generation potentially can discover new things and invent better technologies. The new cultural skills and knowledge are added onto what was learned in previous generations. As a result, **culture is cumulative**. Due to this cumulative effect, most high school students today are now familiar with mathematical insights and solutions that ancient Greeks such as Archimedes and Pythagoras struggled their lives to discover.

Cultural evolution is due to the cumulative effect of culture. We now understand that the time between major cultural inventions has become steadily shorter, especially since the invention of agriculture 8,000-10,000 years ago. The progressively larger human population after that time was very likely both a consequence and a cause of accelerating culture growth. The more people there are, the more likely new ideas and information will accumulate. If those ideas result in a larger, more secure food supplies, the population will inevitably grow. In a sense, culture has been the human solution to surviving changing environments, but it has continuously compounded the problem by making it possible for more humans to stay alive. In other words, human cultural evolution can be seen as solving a problem that causes the same problem again and again. The ultimate cost of success of cultural technology has been a need to produce more and more food for more and more people.

The invention of agriculture made it possible for our ancestors to have a more controllable and, subsequently, dependable food supply. It also resulted in settling down in permanent communities. This in turn set the stage for further developments in technology and political organization. The inevitable result was more intensive agriculture, new kinds of social and political systems dominated by emerging elite classes, the first cities, and ultimately the industrial and information revolutions of modern times. City life brought with it the unexpected consequence of increased rates of contagious diseases. Large, dense populations of people make it much easier for viruses, bacteria, and other disease causing microorganisms to spread from host to host. As a result, most cities in the past were periodically devastated by epidemics.

The rate of cultural evolution for many human societies during the last two centuries has been unprecedented. Today, major new technologies are invented every few years rather than once or twice a century or even less often, as was the case in the past. Likewise, there has been an astounding increase in the global human population. It is worth reflecting on the fact that there are people alive today who were born before cell phones, computers, televisions, radios, antibiotics, and even airplanes. These now elderly individuals have seen the human population double several times. The world that was familiar to them in their childhood is no longer here. It is as if they have moved to a new alien culture and society. Not surprisingly, they often have difficulty in accepting and adjusting to the change. The psychological distress and confusion that accompanies this has been referred to as future shock.

Cultures Change

All cultural knowledge does not perpetually accumulate. At the same time that new cultural traits are added, some old ones are lost because they are no longer useful. For example, most city dwellers today do not have or need the skills required for survival in a wilderness. Most would very likely starve to death

because they do not know how to acquire wild foods and survive the extremes of weather outdoors. What is more important in modern urban life are such things as the ability to drive a car, use a computer, and understand how to obtain food in a supermarket or restaurant.

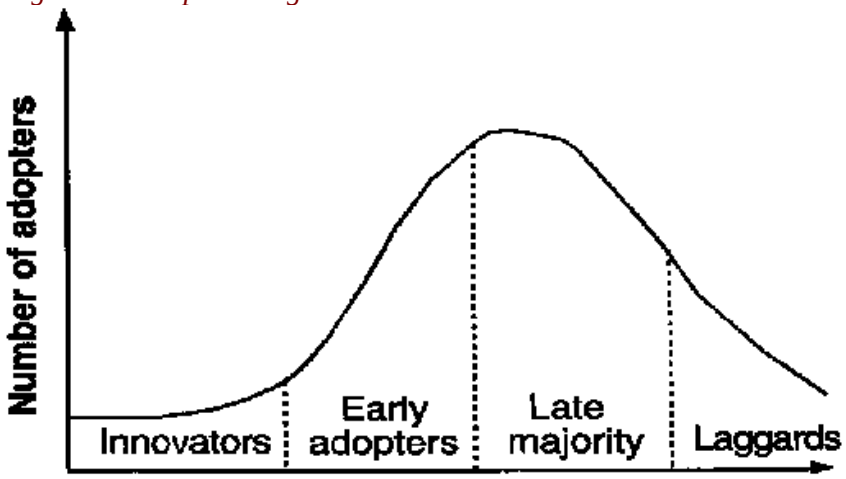
The regular addition and subtraction of cultural traits results in culture change. **All cultures change over time**--none is static. However, the rate of change and the aspects of culture that change vary from society to society. For instance, people in Germany today generally seem eager to adopt new words from other languages, especially from American English, while many French people are resistant to it because of the threat of "corrupting" their own language. However, the French are just as eager as the Germans to adopt new technology.

Change can occur as a result of both inventions within a society as well as the diffusion of cultural traits from one society to another. Predicting whether a society will adopt new cultural traits or abandon others is complicated by the fact that **the various aspects of a culture are closely interwoven into a complex pattern**. Changing one trait will have an impact on other traits because they are functionally interconnected. As a result, there commonly is a resistance to major changes. For example, many men in North America and Europe resisted the increase in economic and political opportunities for women over the last century because of the far ranging consequences. It inevitably changed the nature of marriage, the family, and the lives of all men. It also significantly altered the workplace as well as the legal system and the decisions made by governments.

Diffusion theory

Many studies have been made since the 1930's to assess how new innovations are diffused in a society. One of the most prolific writers was Everett Rogers. In his book, "Diffusion of Innovations" (1962) he suggested that adoption was a social phenomenon, characterized by a normal distribution. See figure 2. 3

Figure 2.3 Adopter categories



Cultural Diffusion Theory of Franz Boas (1996)

Franz Boas think that social and culture of person might have the starting point differently and independently (Independent invention), many social which has alike culture, because of the spreading of culture from one social to other social. ∀ariety culture acceptable makes development of culture and culture mixed.

Characteristics of Thai Culture

Nation Culture Law Act 1942 has device Thai culture in 4 points.

1. Characteristic shows the growth of the material and mind
   The growth of the material means good food, good residence, convenience transportation, and good school, good hospital.
   The growth of mind means high merit such as honest, mercy, unselfish and economizes.

2. Characteristic shows the regulation
   Dressing is suit for situation, popularity, clean and orderly.
   Behavior is appropriate and respect to tradition.
3. Characteristic shows harmony and nation improvement

3.1 Nations agreement and united.
3.2 Literary and art progress by kept and encourage art nation.
3.3 Thai people must support Thai culture, love Thai culture, use Thai product and follow Thai traditions.

4. Characteristic shows good morals of people

4.1 Trust in religion.
4.2 Keep regulations and religion protection.

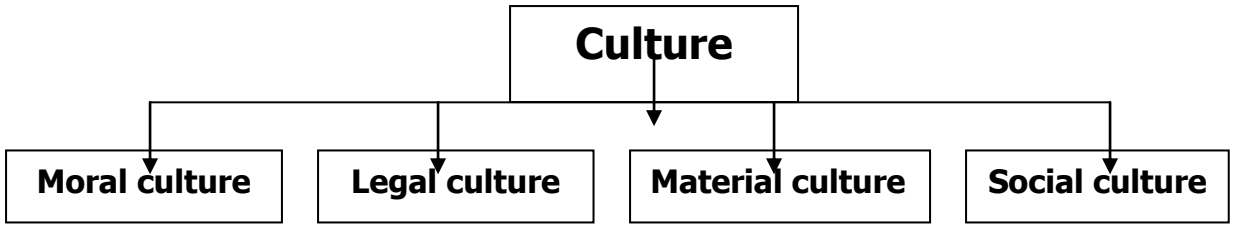
Characteristics of Culture gives by Pardit Mutcima as follow.

1. Culture is learned not instinct.
2. Culture is transmission to new generation continually.
3. Culture is social holds and concentrate.
4. Culture is way of life and practice.
5. Culture modify all the time such as philosophy, popularity, arts, music, art objects, handicraft, industry.
6. Culture is human works

Pongpaga Prasirtsin describes culture in Nation Culture Act 1942 in 4 kinds.

1. Moral culture means culture is the way of life in the social mostly about spirit by stress virtue and moral.
2. Legal culture means culture is standard law and social traditions.
3. Material culture concerns living instrument, clothing, home, medicine, and antiques.
4. Social culture is virtue to make human living with happiness and regulation manner in social.

2.3 Culture Chart in Act of Culture Law



Research idea of education transmission culture

Education is culture pass from one generation to generation or cultural transmission. (Sumon Amonwiwat, 1994) explain the relationship of culture and education. Culture is condition of grows in way of human life. Assuming the role of a key means in developing the human resources of the country since 1961,

education in *Thailand* has gone through a truly comprehensive reform in accordance with the *1997 Constitution* and *1999 National Education Act*.

Education systems are established to provide education and training, often for children and the young. A curriculum defines what students should know, understand and be able to do as the result of education. A teaching profession delivers teaching which enables learning and a system of policies, regulations, examinations, structures and funding enables teachers to teach to the best of their abilities. Sometimes education systems can be used to promote doctrines or ideals as well as knowledge, which is known as social engineering. This can lead to political abuse of the system, particularly in totalitarian states and government.

- **Education** is a broad concept, referring to all the experiences in which students can learn something.
- **Instruction** refers to the intentional facilitating of learning toward identified goals, delivered either by an instructor or other forms.
- **Teaching** refers to the actions of a real live instructor designed to impart learning to the student.
- **Training** refers to learning with a view toward preparing learners with specific knowledge, skills, or abilities that can be applied immediately upon completion.

Turner 1978: 32 – 41 explain education duty as fellows

1. Duty of culture transmission in belief, customs and traditions, from generation to generation.
2. Duty of social control by teaching children follows social rules.
3. Duty of train knowledge skill emphasis in good education for the stability of the social.
4. Duty of select and separate person to work follows the interest and skill.
5. Duty of integration culture from culture to culture.

Boonleart Varchot explains the important of education to culture as education is social process has to learn and train.

1. Education is a tool to know about social evolution and cultural change.
2. Education is a tool of spreads cultural from social to social continuously.
3. Education is process of culture transfer and the personality of a person.
4. Education is process of symbol transfer and the symbol system use.

The Role of Education in Culture Development

Watcharee Krakungan said culture is relation system between human and social, human and environment, and human oneself. Today information technology change rapidly makes culture from other social transfer easily. Education has a role in culture development in 3 important points.

1. Preservation or keeping the culture of the social.
2. Spread culture to social.
3. Create new good culture for the growth of the social.

Besides the role of education in culture development has to consider accordance to the social now and the future, so culture's education choose have

1. Education chooses develop values characteristic and habit of a person in the nation.
2. Education chooses knowledge according to the change of social.
3. Education chooses promote culture identity, folk wisdom, nation culture and nature protection.

The National Education Act 1999

In accord with the requirement of section 81 of the 1997 Constitution, the first National Education Act was promulgated in August 1999 to serve as the fundamental law for the administration and provision of education and training. Essential features and the implementation plan of the Act are

Essential Features of the National Education Act 1999*

General Provisions: Objectives and Principles

Educational provision will be based on 3 principles: 1) lifelong education for all, 2) participation by all segments of society, and 3) continuous development of the bodies of knowledge and the learning process.

The principles in organizing the system, structure, and process of education are: 1) Unity in policy and diversity in implementation; 2) Decentralization of authority; 3) Setting of standards and implementing a system of quality assurance; 4) Raising the professional standards of teachers, faculty staff, and educational personnel; 5) Mobilization of resources; and 6) Partnerships with all sectors of society.

Educational Rights and Duties

At least 12 years of basic education will be provided to all and will be specially provided to persons with special educational needs.

Parents, individuals, organizations and institutions supporting or providing basic education will be entitled to benefits from the government; and tax rebates or exemptions for educational expenditures.

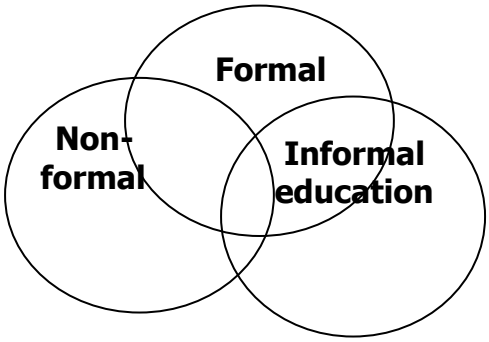
Educational System

Education will be provided in three types: formal, non-formal, and informal education.

Formal education is divided into 2 levels: basic education and higher education, with 9 year compulsory education.

Ministries, bureaus, departments, public enterprises, and other public agencies will be authorized to provide specialized education.

2.4 Chart Show 3 Education System Comparisons



Three education system some part is overlap each other DoeJit LalAuBun (1999, 26)

National Education Guidelines

Education will be based on the principle that all learners are capable of learning and self-development, and are regarded as being most important.

The core curricula for basic education will be prescribed by the Basic Education Commission. Educational institutions will prescribe curricular substance relating to the needs of the community and the society.

Higher education curricula will emphasize academic development, with priority given to higher professions and research.

EDUCATIONAL ADMINISTRATION AND MANAGEMENT

Administration and Management by the State

Public education will be administered and managed at 3 levels:

1) At National Level
The Ministry of Education, Religion and Culture will be established to oversee all levels and types of education, religion, art and culture.

The new Ministry will consist of four organizations: 1) the National Council for Education, Religion and Culture, 2) the Commission for Basic Education, 3) the Commission for Higher Education and 4) the Commission on Religion and Culture.

2) At the Level of Educational Service Area
The administration and management of basic education and higher education at lower-than-degree level will be based on the educational service areas.

In each educational service area, there will be an Area Committee for Education Religion and Culture.

3) At the Educational Institution Level
In each institution providing basic education and that of lower-than-degree level, there will be a board supervising and supporting the management of the institution.

The Ministry of Education, Religion and Culture will decentralize authority in educational administration and management directly to the Committees and Offices of the educational service areas as well as the educational institutions.

Administration and Management by Local Administration Organizations

Local administration organizations will have the right to provide education at all levels according to readiness, suitability and requirements of the local areas. The Ministry of Education, Religion and Culture will prescribe the criteria and procedure for assessing the readiness to provide education of the local administration organizations and will coordinate and promote the capability of those organizations to provide education in line with the policies and standard required.

Administration and Management by the Private Sector

Education by the private sector will be administered and managed independently with the governments overseeing, monitoring and assessment of educational quality and standards.

The government will provide support to private education institutions.

EDUCATIONAL STANDARDS AND QUALITY ASSURANCE

Quality assurance systems will be established in educational institutions as part of educational administration.

An Office for National Education Standards and Quality Assessment will be established as a public organization responsible for external evaluation.

All educational institutions will receive external quality evaluation at least once every five years.

TEACHERS, FACULTY STAFF, AND EDUCATIONAL PERSONNEL

An Organization for Teachers and Educational Administrators, the Fund for the Development of Teachers, Faculty Staff and Educational Personnel, as well as a Fund for Promotion and Development of Teachers, Faculty Staff and Educational Personnel will be established.

Teachers, administrators of educational institutions, educational administrators and other educational personnel in both the public and private sector, with the exception of faculty staff, institution administrators and administrators for higher education at degree level, are required to have professional licenses.

There will be a central organization responsible for administering personnel affairs of teachers as well as a law with regard to salaries, remuneration, welfare and other benefits for teachers and educational personnel.

Resources and Investment for Education

Resources and investment for education will be mobilized from all sectors. Government and local administration organizations will be authorized to levy educational taxes.

There will be a system for auditing, following-up and the evaluation of efficiency and effectiveness in utilization of the educational budget.

Technologies for Education

The government will distribute frequencies, signal transmission devices and other infrastructure for communication for use in provision of education and the enhancement of religious, artistic, and cultural affairs.

The Technology for Education Development Fund will be established, as well as a central unit responsible for proposing policies, plans, promotion and coordination of research, development and utilization of technologies for education.

CONCLUSION

DoeJit LalAuBun (1999, 26) Three education system occurred many thousand years ago. Educations occurred because of human suspect and try to solve the doubt. First education centre is home (family) next the community place such as temple (Wat) is the place to give knowledge to student and then develop to school. Although now, it will have education system in school but in fact family and community help human for learning and developing knowledge all the time.
Lifelong learning will develop human latency which affect social, culture, community, and nation in the future.

THE IMPORTANCE OF SUPHAN BURI CULTURE

Suphan Buri (Thai: สุพรรณบุรี) is one of the central provinces (*changwat*) of Thailand. Neighbouring provinces are (from north clockwise) Uthai Thani, Chai Nat, Sing Buri, Ang Thong, Phra Nakhon Si Ayutthaya, Nakhon Pathom and Kanchanaburi.

The word *Suphan* originates from the Sanskrit word *Suvarna*(Devanagari: सुवर्ण) meaning *gold*, and the word *buri* from Sanskrit *Purī*(Devanagari: पुरी) meaning *town* or *city*. Hence the name of the province literally means *City of Gold*.

The terrain of the province is mostly low river plains, with small mountain ranges in the north and the west of the province. The southeastern part with the very low plain of the Tha Cheen river is paddy rice farming area.

Suphan Buri might be the site of the legendary Suvarnabhumi,[*citation needed*] which is mentioned in very old Buddhist writings. However the first confirmed historical settlement was in the Dvaravati period, when the city was known as Mueang Thawarawadi Si Suphannaphumi. Its founding did take place 877-882. Later it was called U Thong, and was the home city of Prince U Thong, the founder of the Ayutthaya kingdom. King Khun Luang Pha Ngua finally gave it the current name. Suphan Buri was an important border city, and also the location of several battles with the neighbouring Burmese.

The provincial seal shows the elephant battle between King Naresuan the Great and the crown prince of Burma in 1592, which took place in Suphan Buri.

The province is subdivided into 10 districts (*Amphoe*). The districts are further subdivided into 110 communes (*tambon*) and 977 villages (*muban*).

1. Mueang Suphan Buri
2. Doem Bang Nang Buat
3. Dan Chang
4. Bang Pla Ma
5. Si Prachan
6. Don Chedi
7. Song Phi Nong
8. Sam Chuk
9. U Thong
10. Nong Ya Sai

Famous products from Suphan Buri include bamboo and rattan basketry. Suphan Buri artisans show their talents by putting patterns of bullet wood flowers, plumeria blossom and Suphan Buri's durian thorn in the basket. Suphan Buri is famous for local chiffon soft cake Sali Suphan, canned water chestnut, canned bamboo shoots, termite mushroom, honey roasted duck, baked chicken, small-scale croaker, sun dried fish, and sun-dried beef.

SUPHAN BURI CULTURE

Don Chedi Memorial Day (งานอนุสรณ์ดอนเจดีย์): The annual celebration is held on 25 January of each year. Fair goers can enjoy watching a mock-up war on elephant back, performance on stage. The fair always runs for 9 days.

Kam Fa Tradition (ประเพณีกำฟ้า): The ancient tradition of the Thai Phuan ethnic group is always held in February. Thai Phuan people will dress up in traditional attire, offering food and sweets to monks and celebrate in a large party at night. This traditional practice remains in Thai Phuan villages in Amphoe U Thong, and Tambon Makham Lom of Amphoe Bang Pla Ma.

Bun Bang Fai or Rocket Festival (ประเพณีบุญบั้งไฟ): Thai Phuan and Thai Wiang also enjoy the local rocket festival on the full moon day of the 6th lunar month, worshipping the rain god in the monsoon season. A parade of great fun will be held before the rocket launching at the temple. The tradition remains in many Tambons such as Tambon Ban Khong, Ban Kham, and Don Kha in Amphoe U Thong, and Tambon Wat Bot, and Makham Lom of Amphoe Bang Pla Ma.

Thing Krachat (งานเทศกาลทิ้งกระจาด): The merit-making festival is held annually around August-September in the municipal area. Thousands of poor people always gather for free food and necessities.

Tak Bat Thewo (ประเพณีตักบาตรเทโว): A large event of merit making is always held to mark the end of Buddhist Lent in October. Buddhists prepare various food and items, particularly the so-called 'Khaotom Luk Yon' or seasoned sticky rice wrapped in coconut leaves to be offered to monks.

Lao Song Wedding Tradition (ประเพณีแต่งงานของไทยโซ่ง): Lao Song or Thai Song Dam ethnic group always hold a wedding ceremony during the waxing moon periods of the 4th, 6th and 12th lunar months. Thai Phuan people in Tambon Suan Taeng, Amphoe Mueang, and Tambon Ban Don, Tambon Don Makluea, and Tambon Nong Daeng of Amphoe U Thong still have such ceremony, as well.

RESEARCH RESULTS OF THE CULTURAL TRANSMISSION

This research is study the roles of education in cultural transmission in Suphan Buri Province through education systems according to The National Education Act 1999. Suphan Buri culture shows in 19 communities throughout Suphan Buri. Each community has deferent life style depend on the group of people they came from. Suphan Buri culture transmission is importance record such as culture, belief, dressing, music, language, religion, local technology, folk wisdom, nutrition, tradition, and amusement.

Researcher has studied education systems in 3 systems, school system education, informal education, and the personality education as follows.

School systems education

The results of culture transmission in Suphan Buri Province through school systems education. The National Education Act 1999 stress that culture mixed is importance tool for Thai development according to the change of world and technology, basic curriculum have to assort and preserve Thai culture with other culture at the same time. Suphan Buri Province has 439 schools and 100 percentages school bring Suphan Buri culture come to use in every activity education and instruction in school. Local music curriculum (E Saew), singing, playing, Buddha belief, art, and local occupation have transmission through to student.

1. Learning activity in classroom locality culture has integration in curriculum in Thai, social studies, and religion.
2. Local curriculum has developed by expert.
3. Special activity for increasing student skill by invite expertise to teach.
4. School leader arrange and demonstration important activity in special day such as New Year Day, Water Festival Day, Loy Karthog Day, Buddha Day in school.

In-formal system education

The results of culture transmission in Suphan Buri Province through in-formal system education.

Besides learning from the school, student can learn from radio, from activity, from direct experience in community, and from in-formal education. In-formal education has a role to serves education and develops community, student that passes from the education school system. Students who need more occupation knowledge can get it from these places.

5. Non-formal Education Department, Ministry of Education
6. Suphan Buri Culture Center
7. Suphan Buri Community Development and Social Welfare
8. Thailand Local Administration
9. School
10. Wat (temple)

Family system education

The results of culture transmission in Suphan Buri Province through family system education.

Suphan Buri cultures survive and hold until now because family and relative transmission, which happen from Thai social generation to generation. Learning process occur by knowledge transfer from elder, expertise, temple (Wat). When student received culture transmission from family they can bring the transmission knowledge to transfer to their friends in school.

The results of 3 education system are school systems, in-formal system, and family system. Show the importance transmission and development of Suphan Buri cultures. The characteristic of learning knowledge is not different in the way of transfer. Student will more interest in learning knowledge of in-formal system and family system than in school systems. But school systems have the way of succeeded more than in-formal system and family system, because the education in school system can add locality culture and integration in everyday learning.

Summary and Discussion

The research result of the role of education cultural transmission in Suphan Buri by study 3 education system, school system, in-formal system and family system, there are many interesting issue as fellow.

11. The worth of Suphan Buri culture

Suphan Buri has long history more than 3,000 years; they have 19 ancient cities spread throughout Suphan Buri Province. Minority move to live in Suphan Buri such as Laos, Cambodian, China, and Thai, they came with their culture, belief, customs, traditions, and religion, cause Suphan Buri have various worth cultures.

Language and literary of Suphan Buri have various and different from other province such as spoken language, local music, local show, eating culture.

12. The result of the education role in cultural transmission and culture development in Suphan Buri

The education in school system, contribute and integration culture to locality course (curriculum) in every learning by teacher. E Saew music is transmission and development culture effectiveness in school. But the limited of time and place is the big problem of transmission, even though teachers agree to bring expert local to participate in school. Teachers have to consider the importance of centre course (curriculum).

In-formal system education is other source for culture transmission and development depends on the requirement of the community. For example housekeepers who maintain tradition cultural such as dressing, it makes Suphan Buri dressing cultures have many difference styles, and to make new generation appreciate and see the importance of culture transmission. In-formal system education still doesn't sufficient in some community.

Family system education is the most important in culture transmission in Suphan Buri Province, because the transmission can occur all the time, any place and through everybody in the family. The culture transfer inattention from family such as dressing culture, eating culture, belief, religion, customs and traditions.

Schools and colleges define the basic framework of education. Schooling gives us the fundamentals whereas we specialize in fields of our interest, during the degree courses. But education does not end here. It is a lifelong process. Self-learning begins at the point that marks the end of institutional education. The process of self-learning have to continues.

Suphan Buri culture is valuable culture because it is the important thing in the way of life long ago. It makes Suphan Buri famous in Province of Culture. Culture is capital of development in economy, social, and environment, so many institutes in Suphan Buri join and save in culture transmission.

1. Old culture that transmission from the past until now is dressing and spoken language.
2. Culture of local Thai is house, dressing, tradition, baby born, monk, wedding, E Saew music, occupation and amusement.
3. Chinese Culture mostly comes from Tea Chew China. They earn a living as merchant in Suphan Buri. Chinese Culture is respect an ancestor and god, donation, and Chinese New Year.
4. Thai Song Dam Culture come from Laos and Vietnam, today live in Amphoes Muang, Song Phi Nong, U -Thong, Bang Pla Ma. They have their own language and writing. Dark blue and black is the color of Thai Song Dam dress. They also have a special ceremony for new house.

RECOMMENDATIONS

The research results of this study suggest the need for further research to evaluate in a systematic and definitive way the effectiveness of the roles of education in cultural transmission in Suphan Buri Province. The following types of research would be particularly value:

1. Should study the role of education in 3 systems and bring Suphan Buri province culture to use in curriculum in school.

2. Should study the models of transmission particularly important cultural systematically.

3. Should study the influence and reason of transmission culture through the education system.

4. Should study the role of community in protecting and developing Suphan Buri cultural.

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Lecturers' Perspectives on Factors Related to the Effectiveness and Efficiency of Students' Knowledge Management in Faculties of Industrial Education in Government-Funded Universities in Thailand

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ABSTRACT

The purpose of this research was to explore lecturers' perspectives on factors related to the effectiveness and efficiency of Knowledge Management (KM) by students in Faculties of Industrial Education in three government-funded universities in Thailand in 2008. The sample for the study was 18 lecturers. Data collection relied on a questionnaire with a five-point rating scale. The questionnaire focused on demographic data and factors related to the effectiveness and efficiency of KM. The questionnaire was tested for content validity and reliability using Cronbach Alpha reliability test. The data were analysed using descriptive statistics. Results of the study were as follows: faculty members rated at the highest level those factors related to the effectiveness and efficiency of KM. These were KM; building knowledge networks with outsiders and; managing organizations by using mid-level employees.

Keywords: Perspectives, Lecturer, Knowledge Management

INTRODUCTION

Due to rapid economic, social and technological changes worldwide, competition that uses only venture capital, labour, and natural resources is not enough. To compete globally requires knowledge because knowledge is used to create intellectual property. Moreover, knowledge is important to the communities, organizations, and institutions of developing countries (Pattamairiwat, 2004:2). This is particularly relevant in Thailand.

In order to develop new knowledge and to innovate, we need tacit knowledge and explicit knowledge. KM is a management concept of interest to public and private organizations. According to Wichienpanya (2005:1), KM is very important to the Thai community. He argues that it should support and facilitate knowledge producers and knowledge users to create added value and a competitive advantage to lead the

Thai community to be good community. He also argues that a good community uses the religious principle of "Kan 5: morality, wisdom, sustainable economy, suitable government and strong community. According to National Economic and Social Development Plan no.9 (2002-2006) the vision to develop the country to have good communities means balancing three aspects; high quality community, intellectual and learning community, and unanimity community (Wattanasiritham, 2001:13-14).

Nowadays, Government universities are learning-based communities and have various knowledge resources in many forms that consist of fact, opinion, theory, principles, ideas as well as the skills and experience of each person. Decision-making both in daily life and working in organization is necessary for people to use knowledge to be a tool so people can use knowledge efficiently. KM allows an organization to store a large amount of information for easy and prompt use.

A problem with teaching and learning in Government-funded universities in Thailand today is that learning does not conform to real situations in communities. This may be because lecturers lack teaching knowledge. This problem can directly affect students because graduated students cannot apply knowledge within the real world.

Given this problem, when KM combined with Learning, it results to Knowledge Management Learning (KML). KML can be applied to teaching and learning in order for teaching and learning to improve in quality. Moreover, KML can be used to develop to lead to innovation. The authors of this study were interested in gathering instructor's perspectives on the effectiveness and efficiency of KM by students.

OBJECTIVE OF THE STUDY

The purpose of this research was to explore lecturers' perspectives on the factors related to the effectiveness and efficiency of KM performed by students in the Faculties of Industrial Education in Government-funded universities in Thailand.

OUTCOMES OF STUDY

- The researchers know about teaching and learning platforms of students at the Faculties of Industrial Education of Government Universities that are effectiveness and efficiency of KM.
- The researchers know about the concept about KM of students at the Faculties of Industrial Education of Government Universities by Graduate studies manage knowledge both individual and teamwork level.
- Developing and link between knowledge, database and KM to be a system to use exchange knowledge of students at the Faculties of Industrial Education of Government Universities.
- Facilitate learning innovation to students at the Faculties of Industrial Education of Government Universities.
- Government Universities or institutions can used this research to perform KM.

CONCEPTUAL FRAMEWORK (THEORY)

Conceptual framework in KM performed by students at the Faculties of Industrial Education of Government Universities, the researchers use important activities of students at the Faculties of Industrial Education of Government Universities.
The Theoretical Framework use in this study to find Factor Effective KM, that show in table 1.

	KM		KML
	Wijan Panit	Nonaka & Takeuchi	
Objective	Create Vision about Knowledge.	Create Vision about Knowledge.	Create Vision about Knowledge.
	Create knowledge network with outsider.	Create knowledge network with outsider.	Create knowledge network with outsider.
	Create flat culture and all direction communication.		Create flat culture and all direction communication.
Principle	Build knowledge management team of organization.	Build knowledge management team.	Build knowledge management team.
	Emphasize organizational management by using mid-level employees.	Emphasize organizational management by using mid-level employees.	Emphasize organizational management by using mid-level employees.
	Change organizational structure to Hypertext.	Change organizational structure to Hypertext.	Change organizational structure to Hypertext.
Process	Start from existing intellectual capital or find from others.		Start from existing intellectual capital or find from others.
	Create knowledge exchanged situation between low-level employees	Create knowledge exchanged situation	Create knowledge exchanged situation
	Manage knowledge together with product developed activities or new style of working.	Manage knowledge together with product developed activities or new style of working.	Manage knowledge together with product developed activities or new style of working.
	Create recording culture.		Create recording culture.
Evaluation	Evaluate knowledge management result.		Evaluate knowledge management result.

***Table* 1:** *Compare KM model of Panit Wijan,(2005), Nonaka & Takeuchi,(1995)*

KML
1. Create Vision about Knowledge.
2. Create knowledge network with outsider.
3. Create flat culture and all direction communication.
4. Build knowledge management team.
5. Emphasize organizational management by using mid-level employees.
6. Change organizational structure to Hypertext.
7. Start from existing intellectual capital or find from others.
8.Create knowledge exchanged situation
9. Manage knowledge together with product developed activities or new style of working.
10. Create recording culture.
11. Evaluate knowledge management result.

Figure 1: *Factor of KML*

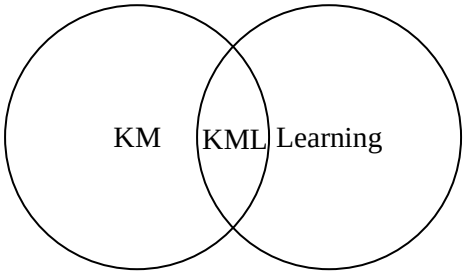

Figure 2: *Model of KML*

RESEARCH METHODOLOGY

Data Collection

Use lecturers in related field with KM in Government Universities that consisted of 18 faculty members from 3 universities by sending all of documents via e-mail and privately.

Questionnaire

Use open questions to lecturers 4 times

1. The first questionnaire is questionnaire by using general open questions to concentrate to lecturers' perspectives via post mail for convenience to lecturers. Time limitation is within 2 weeks. For the first questionnaire, researchers gather lecturers' perspectives, analyse, and synthesize by cut redundant information to be used next questionnaire.
2. The second questionnaire is questionnaire by using answers from the first questionnaire. Questionnaires (5 points rating scales) were used as research tools to lecturers can weight in each question including the reason why they agree or disagree.
   This second questionnaire sent to lecturers via post mail. For the second questionnaire, researchers gather lecturers' perspectives, analyse, and synthesize by finding Median, Mode, and Interquartile Range.

3. The third questionnaire is analyzing the answers from the second questionnaire by determine Interquartile Range that is if Interquartile Range is narrow, answers are consistent. In this case, researchers can summarize. However if Interquartile Range is wide that means answers are not consistent. The researchers create the third questionnaire (same information with the second questionnaire but add median value, Interquartile Range value, and marks that show answers of lecturers in the second questionnaire) and send back to lecturers again.
4. The fourth questionnaire follows by the third questionnaire. If the result is consistent that is Interquartile Range is narrow. Usually, Delphi research can find result of research in the third questionnaire.

When the researchers receive all of 18 lecturers' perspectives, they use answers to find The Cronbach Alpha reliability coefficient is .88

Data Analysis

Use basic statistic analysis on SPSS by mean value $\bar{X}$ ad S.D. by Pearson Product Moment for finding the value the variable.

Results of the Study

The results of the study were as follows:
The highest level is manage knowledge together with product developed activities or new style of working ($\bar{X}$= 4.52, S.D. = .77), next is create knowledge network with outsider ($\bar{X}$= 4.42, S.D. = .76), the lowest level is Emphasize organizational management by using mid-level employees ($\bar{X}$= 3.52, S.D. = .61)

Results showed that perspectives on factors related to the effectiveness and efficiency of KM by students in Faculties of Industrial Education in three government-funded universities in Thailand in 2008.

Results of this research can be creating a new style of learning, knowledge management learning (KML).KML is combine factors of KM, teaching and learning.

DISCUSSION AND CONCLUSION

This research is reflected lecturers' perspectives. When determining analysed result, it knowledge together with product developed activities or new style of working influence highly to KM because KM together with developing work quality are made quality of work highly that mean they can response with need of both learners and Government Universities. Moreover, they can develop potentiality and lead to developing learning innovation efficiently. Next is create knowledge network with outsider also influence highly to KM. Linking or building network can do through sharing ideas and using technology knowledge for example e-mail, newsgroup, chat, video conference etc. Last is organizational management by using mid-level employees influence to KM at the lowest level because employees who link vision between executive level and learners is cause of KM problem due to executive level do not know learners' problem and learners have to follow policy that executive level program.

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SUMMATION SESSION

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Honoured Guests, Ladies and Gentlemen,

I would like to express my warm thanks to Edith Cowan University, Khon Kaen University and Bansomdejchaopraya Rajabhat University for taking the initiative, hosting and sponsoring this conference. Over the last few days, over 100 international and local delegates from industry, academia, and professional bodies have come together to listen, learn and gain an overview of the various drivers for sustainability within higher education, with a specific focus on 'quality education'. Higher education is currently faced with increased challenges, some of which have arisen due to the movement to a system of mass education. Together with a more diverse student body, rising administrative duties for academic staff and decreased funding, many universities are facing difficult decisions. This situation is made even more complicated due to the lack of financial security experienced by some of the more traditional universities. However, a combination of the movement towards a more commercial type of management, and a trend towards enhanced learning and teaching, has raised the profile of leadership and especially academic leadership in higher education.

This conference has highlighted the key roles that higher education institutions can play in their regions. We educate students, conduct research that increases strategic engagement, support businesses, public services and cultural institutions. We prepare our students for the world of work and have a long history of collaboration with professional bodies. The presentations at this conference have looked at ways at how we can best contribute to development in our region through the expansion of a knowledge-based economy through bringing together policy makers and practitioners, public and private institutions concerned with regional development; leaders and managers of higher education institutions; and those responsible for fostering community liaison and engagement at these institutions.

To me there were two strong issues which have emerged from the conference presentations:

Engagement with and through Higher Education
High quality initiatives and innovations

I will address each of these in turn.

First, Engagement with and through Higher Education

From the presentations, it became clear how important and integral a part of the success and future of a community is the university. This success is essential to the achievement of our own ambitions. Some examples may be helpful here. Associate Professor Ratananakul, Deputy Secretary General, Commissioner on Higher Education, in his current role has undertaken to focus on the production and development of graduates of quality, capable of life long work and adjustment. The quality of higher education institutions will be promoted and opportunities for students increased. He raised the issue of connection to community and through a multidisciplinary approach building capacity according to the needs of the local community. He emphasised the importance of research and how this must feed into curriculum development. It will be through this strengthening of Thailand's Higher Education Institutions

that will produce graduates capable of taking their place in a challenging world whilst at the same time contributing to the wider community.

Professor Thomas Wong from the Hong Kong Institute of Education continued this theme by suggesting that the shift in higher education poses continued challenges and ultimately the sustainability of some universities. He raised the issue of entrepreneurship and its role in leadership particularly its value to the sustainability of higher education. We need to be more flexible which is a challenge for us regarding curriculum structure, traditional teaching methods and the university structure. Again the notion of interdisciplinary collaboration in Learning and Teaching and Research was stressed. There is too much of a top down approach. Higher Education must reflect the experience and conditions of contemporary life. We must teach our students to make sense and how to reflect the reality.

We learnt about the difficulties involved in linking with communities in many ways and the barriers that need to be overcome for effective engagement and sustainability. We need to focus on the people especially at a personal level. We need to rethink our strategies and develop diplomacy to develop the community and university partnerships. The community partners need to understand the university processes and connection. The effect that students have on their communities is often unreported especially their voluntary activities and work place integrated learning. Excellent initiatives by James Cook University, is but one example. Professor Renner and Professor Cross provided examples of ways of empowering universities through various forms of community engagement. As illustrated by a community project in Thailand where staff and individuals from Rajabhat Universities have seized opportunities to enhance engagement for sustainability. The address by Dr Logan Muller from Unitec in New Zealand provided examples where as a society we have made great strides especially through technological advancements. Yet it is this very progress that has led us down a disastrous path. We were challenged to think about the reasons for the existence of education. If we want to provide a sustainable future for the next generation, we have to incorporate sustainability into our learning, our practice and our daily lives. If we don't, the consequences will be catastrophic.
Let me now turn to the second point:

High quality initiatives and innovations for sustainable development

I have been greatly impressed by the diversity and quantity of activities that have been raised at this conference. This work has had a profound effect on the local and the wider communities and simply would not happen to the same degree if it were not for the involvement of the universities. Also think of the benefits to our students. The volunteering work expands their horizons and exposes them to the communities, improves their organisational and communication skills and makes them aware of a community and its meaning. Professor Pornchai Matangkasombut from Bansomdejchaopraya Rajabhat University examined the responsibility of universities in preparing students to take their place in society as valuable citizens. Communities come first and we need to adopt that perspective. Universities do develop and transmit knowledge but it should be for the benefit of the community. He mentioned the role of politicians and how we need to influence them, and work with them to promote our agenda. We have a duty to INSPIRE our students. It is through the impact of our research on our teaching that we will develop future citizens who are inspired and ready to take their place in society as well as be competent professionals.

The way we engage with our students from a learning and teaching perspective has been raised in many presentations and directly impacts on the sustainability of quality learning and teaching. These issues ranged from preparing students to learn online, reflective case studies, equipping our students with not only advanced technology but also to develop the expertise to effectively use low technology such as digital audio, planning their studies, ways to incorporate e-learning methods and cross cultural perspectives into our courses. Experiential learning and problem based learning requires us to alter the

curriculum with challenges to academics from a leadership perspective. Simulation where the student is in control is an effective learning tool and strategy. Some presentations referred to students as customers and the different expectations of students based on gender. The immediate gratification of Generation Y students should be acknowledged.

What have we learned? With all the daunting challenges currently facing the international arena, universities and their communities are now inextricably linked. How and what we do to ensure the sustainability of the community, interdisciplinary initiatives, innovations in learning and teaching and entrepreneurship in higher education will impact long term improvements where we need to make a major contribution and influence the productivity and prosperity of our nations. The knowledge economy is depending on universities to provide this leadership. Judging from the presentations at this conference, the sector is committed to this in many ways.

My final thoughts are that there are now unparalleled opportunities for all universities to be more responsive and flexible and not only sustain our endeavours but make a true difference to the quality of life locally and internationally. As I am sure you are all aware we cannot afford to contemplate any alternative but total commitment to success and I am certain that working towards sustainable processes and quality education, we will strive to achieve new heights of excellence in the future. I wish you all the very best.

Thank you very much.